ROUTLEDGE HUMAN DEVELOPMENT AND CAPABILITY DEBATES

TECHNOLOGY AND HUMAN DEVELOPMENT

Ilse Oosterlaken

'Ilse Oosterlaken has been at the forefront of developing insights on the role and importance of technology in the capability approach. *Technology and Human Development* is a major contribution to the literature on the capability approach, and it also illuminates the importance of the capability approach for anyone working on technology.'

Ingrid Robeyns, Utrecht University, the Netherlands

'Engineers are commonly committed by their professional codes of ethics to holding paramount public safety, health and welfare in their design, construction, operation and management of a progressively engineered world. The standard engineering education curriculum, however, involves little learning about public welfare. Ilse Oosterlaken's good book on *Technology and Human Development*, by engaging with the capability approach to welfare economics pioneered by Nobel Prize economist Amartya Sen, is a valuable contribution to enhancing the welfare regarding capabilities of engineering and engineers.'

Carl Mitcham, Colorado School of Mines, USA

'With a remarkable interdisciplinary approach, philosopher and engineer Ilse Oosterlaken discusses how technologies could contribute to expanding the capabilities and agency of people. In a very intelligent manner, she studies the technology–capability relationship in two ways: a "zooming in" on the design details and "zooming out" to the embedding of technical artefacts in society. The result is a compelling book essential for those interested in approaching technology from a social justice perspective.'

Alejandra Boni, Universitat Politècnica de València, Spain

'Technologies have a key role to play in human development as envisioned by the radically pluralist capability approach. This insightful book is a milestone contribution in this rapidly expanding area of enquiry, skilfully connecting the conceptual spaces of the capability approach with design studies, science and technology studies and philosophy of technology. Based on carefully chosen case studies, Ilse Oosterlaken convincingly explains how the analysis needs to include both an examination of the design details and an account of the socio-technical networks in which they are embedded. Significantly, she points out that the capabilities approach is a useful lens to examine technology use not just in the global South, but globally.'

Dorothea Kleine, University of London, UK, and author of
Technologies of Choice: ICTs, Development
and the Capabilities Approach

'For years, Ilse Oosterlaken has been doing cutting-edge research that brings together two important strands of theory that typically are only addressed by separate communities: philosophy of technology and the capabilities approach. *Technology and Human Development* captures her central insights and presents the most mature articulation of them to date. It is essential reading for both academics and practitioners interested in the topic.'

Evan Selinger, Rochester Institute of Technology, USA

TECHNOLOGY AND HUMAN DEVELOPMENT

This book introduces the capability approach – in which well-being, agency and justice are the core values – as a powerful normative lens to examine technology and its role in development. This approach attaches central moral importance to individual human capabilities, understood as effective opportunities people have to lead the kind of lives they have reason to value. The book examines the strengths, limitations and versatility of the capability approach when applied to technology, and shows the need to supplement it with other approaches in order to deal with the challenges that technology raises.

The first chapter places the capability approach within the context of broader debates about technology and human development – discussing among others the appropriate technology movement. The middle part then draws on philosophy and ethics of technology in order to deepen our understanding of the relation between technical artefacts and human capabilities, arguing that we must simultaneously 'zoom in' on the details of technological design and 'zoom out' to see the broader socio-technical embedding of a technology. The book examines whether technology is merely a neutral instrument that expands what people can do and be in life, or whether technology transfers may also impose certain views of what it means to lead a good life. The final chapter examines the capability approach in relation to contemporary debates about ICT for Development (ICT4D), as the technology domain where the approach has been most extensively applied.

This book is an invaluable read for students of development studies and science and technology studies (STS), as well as policy makers, practitioners and engineers looking for an accessible overview of technology and development from the perspective of the capability approach.

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The Routledge Human Development and Capability Debates series

Series editors: Séverine Deneulin, Ortrud Leßmann and Krushil Watene

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FIGURES

INTRODUCTION

Of bicycles, capabilities and development

Do Bicycles Equal Development in Mozambique? was the somewhat odd title of a book that appeared some years ago (Hanlon and Smart 2008). Bicycles? What would make one ask a question like that? In their introductory chapter the authors describe the case of Felito Julião. That a person like him has a bicycle, the authors note, was uncommon in Mozambique a decade before. Julião uses the bicycle to earn a living, by transporting and selling sugar cane. In this way he earns 1.5 times as much as he would have earned without the bicycle. If he had to walk, he would only be able to transport one bundle of cane at a time, or perhaps in that situation he would not sell sugar cane but work on a neighbour's field instead. The authors of the book then go on to explain why they asked the question about equating bicycles with development. This question (p. 2):

> reflects the response we received when we told people we were writing a book about Mozambican development. Everyone responded in the same way: there are more bicycles. That is true. We saw bicycles everywhere and each chapter of this book is headed by a photo of someone using a bicycle, often to carry other people or large loads. *But are bicycles an accurate measure of development?* There are more cars, as well. But most people still walk. Houses are another measure of

development. In Maputo, there is a surprising number of houses costing hundreds of thousands of dollars, and it looks as if there is development. Driving through rural Nampula province, we certainly saw many villages with one or two improved houses, built of blocks or bricks and with metal sheets or tile roofs. But most people live in mud or wattle and daub houses with thatched roofs. Bouncing along the terrible road from Nampula to Ribáuè, we saw much less development. [emphasis added]

The rest of their book investigates whether there is indeed development in Mozambique. Two things in the above quote are of particular interest for the purposes of this book. The first is that the authors note that, measured in terms of car access and home ownership, a lot of inequality still exists in Mozambique. The second is their question whether bicycles are an accurate indicator of development.

The question of how to best assess or measure development and inequality has been given an interesting and influential answer in the oeuvre of Amartya Sen (1979, 1985, 1999), who won the 1998 Nobel Prize for his work in welfare economics. His work on the capability approach has among others provided part of the intellectual foundations for the human development paradigm of the United Nations Development Program (UNDP). Another major scholarly source for the capability approach is the work of philosopher Martha Nussbaum (2000, 2011).[1] These two thinkers both argue that assessment of development progress should not be made in terms of income or resource possession, but in terms of valuable individual human capabilities – or what people are effectively able to do and be. Examples are the capabilities to be healthy and to have meaningful social relations. The capability approach conceptualizes development as a process of expanding such valuable capabilities for each and every person, so that they have the real and effective freedom to realize a life they have reason to value.[2] According to a recent introduction this approach[3]

is generally understood as a conceptual framework for a range of normative exercises, including most prominent the following: (1) the assessment of individual well-being; (2) the evaluation and assessment of social arrangements; and (3) the design of policies and proposals about social change in society.

(Robeyns 2011: §1)

In the past decades, people have started to apply the capability approach to a range of areas and issues, including health, education, disability and gender (Robeyns 2006). This book explores how the capability approach can be brought to bear on technology. Mirroring the three exercises mentioned by Robeyns in the quote above, this book discusses the evaluation and assessment of technology (exercise 2), and the design of technical artefacts and the development of socio-technical networks as ways to bring about a positive social change (exercise 3). The term 'evaluate' already indicates that defining the values against which to make judgements is inherently part of such exercises. The core claim of the capability approach is that people's 'freedom to achieve well-being is of primary moral importance' (Robeyns 2011: 1). This is the value that should – according to capability scholars – be central in our evaluative exercises. In the capability approach 'freedom to achieve well-being' is further conceptualized in terms of *valuable* individual capabilities. The capability approach as a conceptual framework can be applied in a purely descriptive way, for example when a study merely makes an inventory of which capabilities people have or explains to which capabilities some social arrangement or technology contributes. However, often the capability approach is used in a normative way, to make a judgement about whether people's lives are going *well* or whether some social arrangement or technology is *good* to have. For this reason, in the quote above Robeyns describes the capability approach as 'a conceptual framework for a range of *normative* exercises' (emphasis added).

Core concepts and ideas in the capability approach

The bicycle, in all its simplicity, makes for a good example to further introduce some core concepts and ideas of the capability approach. Further elaborating on the example of the bicycle also provides a first rough sketch of the complex and multifaceted relation between technology and human capabilities – which will be further discussed in the chapters to come. As it happens, the bicycle has been used in the early literature on the capability approach to explain its rationale:

> Having a bike gives a person the ability to move about in a certain way that he may not be able to do without the bike. So the transportation characteristic of the bike gives the person the capability of moving in a certain way. That capability may give the person utility or happiness if he seeks such movement or finds it pleasurable. So there is, as it were,

> a sequence from a commodity (in this case a bike), to characteristics (in this case, transportation), to capability to function (in this case, the ability to move), to utility (in this case, pleasure from moving).
>
> It can be argued that it is the third category – that of capability to function – that comes closest to the notion of standard of living. The commodity ownership or availability itself is not the right focus since it does not tell us what the person can, in fact, do. I may not be able to use the bike if – say – I happen to be handicapped. Having the bike – or something else with that characteristic – may provide the basis for a contribution to the standard of living, but it is not in itself a constituent part of that standard.
>
> *(Sen 1983: 160)*

A technical term often used in the capability approach is that of 'conversion factors' that play a positive or negative role in the 'translation' from a resource into a capability. The term refers to any factor that needs to be 'right' as a precondition for expanding a person's capability by means of a resource. In the example above, a personal conversion factor – being disabled – blocks the expansion of the capability of moving around. One could also think of other factors, not mentioned by Sen, obstructing or facilitating the expansion of human capabilities by means of bicycles. A person in the Netherlands – a country which has good roads and even many separate bicycle lanes – will gain more capabilities from owning a bicycle than a Bedouin living in the desert. This is an example of environmental conversion factors. And ownership of a bicycle hardly expands the capabilities of women in Saudi Arabia, as local religious authorities unfortunately do not allow them to cycle[4] – thus a cultural or social conversion factor is problematic in this example. The example of bicycles and women in Saudi Arabia may also serve to illustrate why – according to Sen – capabilities are not only a better indicator of quality of life than resources, but also a better indicator than subjective well-being (such as happiness, desire satisfaction or utility, 'in this case, pleasure from moving'). Sen (1983: 160) says the following about this:

> while utility reflects the use of the bike, it does not concentrate on the use itself, but on the mental reaction to that use. If I am of a cheerful disposition and enjoy life even without being able to move around, because I succeed in having my heart leap up every time I behold a rainbow in the sky, I am no doubt a happy person, but it does not follow that I have a high standard of living … So the constituent part

of the standard of living is not the good, nor its characteristics, but the ability to do various things by using that good or those characteristics, and it is that ability rather than the mental reaction to that ability in the form of happiness that, in this view, reflects the standard of living.

We can imagine that some women in Saudi Arabia might adjust their preferences under the influence of the society in which they grow up, and no longer wish to go places by bicycle (or other means of transportation). Extreme poverty may, Sen fears, sometimes have the same effect on people's aspirations and expectations. This is what he calls the problem of adaptive preferences. It is one of the reasons why he proposes to focus on capabilities when assessing inequality and development. Because people in poor areas in the world may have adjusted their expectations and aspirations, they may experience equal levels of happiness or satisfaction with (aspects of) their life as people living in wealthy areas. According to the capability approach we can however not simply conclude from this that there is no moral need for initiatives to reduce poverty. At the same time we should be careful not to label people's preferences too easily as 'adaptive'. A careful ethical evaluation of preferences is needed before doing so. The reason is that the capability approach acknowledges that people may hold very different yet legitimate ideas about what a good life consists of and that people should be able to make their own life choices accordingly. In other words: the capability approach has a high regard for human agency. 'Agency' refers to the ability that humans have to reflect on what they value, to set goals and to pursue the realization of those goals. 'The opposite of a person with agency', Alkire (2005a: 3) argues, 'is someone who is forced, oppressed, or passive'. Crocker and Robeyns (2010) distinguish four dimensions in Sen's understanding of agency: self-determination, reason orientation and deliberation, action, and impact on the world. Without having sufficient capabilities, people would not be able to take certain actions and/or make an impact on the world.

Respect for human agency is the main reason why the capability approach makes a theoretical distinction between 'capabilities' and 'functionings'. This is a distinction, so Robeyns (2005: 95) explains, 'between the realized [functionings] and the effectively possible [capabilities]; in other words, between achievements on the one hand, and freedoms or valuable options from which one can choose on the other'. From a normative perspective it may make a difference whether one focuses on the functionings or the capabilities of people. An example that capability scholars regularly refer to (e.g. Alkire 2005a) is that a person who is fasting may reach a condition that seems

similar to a person who is starving. Both are undernourished and their bodily functioning is thus the same. Yet from a normative perspective there is an important difference: one person has the capability to eat but chooses not to; the other person does not have the capability. The capability approach acknowledges that people pursue not only their own well-being, but may also choose to pursue other ends. Examples are promoting the well-being of others or living up to religious ideals. The person who is fasting exercises his agency in order to achieve some goal, even though this may be at the expense of personal well-being. We need to acknowledge that people may have very different ideas of what constitutes a good life, and different preferences. According to the capability approach policy makers should therefore ideally aim at merely expanding people's capabilities and not force people into certain functionings, like being well fed. However, capability scholars recognize that there are contexts in which it is appropriate to focus on functionings (Robeyns 2011). If people have a wide-ranging set of capabilities, they are empowered to realize the kind of life they value. The implication is that 'in real life two people with identical capability sets are likely to end up with different types and levels of achieved functionings, as they make different choices following their different ideas of the good life' (Robeyns 2005: 101).

There is a further way in which agency is discussed in the capability approach literature. In his many publications Sen has repeatedly emphasized that we should not see the income-poor as passive 'patients' to be helped. Individuals and groups, according to Sen, should be enabled to be 'active participant(s) in change, rather than … passive and docile recipient(s) of instruction or of dispensed assistance' (1999: 281). For Sen, agency is not only something that is enlarged as a result of a development process, by expanding people's capability set. In Sen's view, people do not only exercise their agency in making choices in their own, personal lives. Agency should be exercised during development itself – which is not only about the outcome, but also about how we get there. People exercise their agency while bringing about change in their community and society at large – possibly contributing to goals beyond their individual well-being. Capabilities have a double role here, in the sense that they are both ends in themselves (or at least, some capabilities are) and a means for people to take charge of the development process. By exercising their agency people bring about further change in both their lives and in their community/society.

It is important to realize that the capability approach takes an interest in those human capabilities that are *intrinsically valuable*. A person may choose to

turn these capabilities into functionings, which 'together constitute what makes a life valuable' to that person (Robeyns 2005: 95), they are 'constitutive of a person's being' (Alkire 2005b: 118). Examples of such intrinsically valuable capabilities are the capability to be healthy and the capability to maintain nourishing personal relations. Not all capabilities that a person may have belong to this category of intrinsically valuable capabilities. Some capabilities may be trivial from the perspective of justice and development. Having a tenth brand of washing powder available certainly adds something to the choices a person has. However Sen (1987) agrees with critics[5] that it does not expand the capabilities we have reason to value, it does not give us extra freedom to realize something of value in our life. Other capabilities may be even outright undesirable to promote. Nussbaum (2000) gives the example of the capability for cruelty – which new torture devices could certainly expand. In short: a normative evaluation of capabilities is needed. Nussbaum has for example identified a list of ten central human capabilities that are – according to her – needed for living a flourishing human life, in conformity with human dignity. She claims that justice requires bringing each and every human being over a certain threshold for each of the capabilities on her list. Although Sen gives plenty of examples of valuable capabilities in his work, he has always refused to make such a list. His reasons are that the proper list of capabilities may depend on purpose and context, and should be a result of public reasoning; not something a theorist should come up with (Robeyns 2005). Which capabilities matter, for example for evaluating development projects, is an important topic of discussion in the capability approach literature. It also raises the questions how we should decide about this and who should be involved in the decision process (Crocker 2008). These are questions which have been extensively addressed in the capability approach literature.

Capabilities and technology

Not all capabilities expanded by technologies belong to the category of intrinsically valuable capabilities. Many 'technology-enabled' capabilities have merely instrumental value, because of their contribution to intrinsically valuable capabilities. For example, a hammer and nails may expand one's capability to join timber, which may in turn be important for expanding one's capability to have adequate shelter. This capability in turn contributes to one's capability to be healthy – which is intrinsically valuable. Furthermore, some capabilities have both instrumental value and intrinsic value, in

other words they are both means and ends at the same time. The bicycle example may again be used to illustrate. Generally, the freedom to go to places to which one wants to go, which is expanded by the bicycle, seems intrinsically valuable. More specifically, a mountain biker could also appreciate his capability to cycle because of the challenging outdoor experience and shared social activity it offers. For many others the capability to get about with a bicycle may be merely of instrumental value, as – for example – it may contribute to one's capability to visit friends, or to one's capability to exercise and in that way maintain good health. Having a bicycle may furthermore contribute to one's livelihood opportunities (as in the case of Felito Julião in Mozambique), which could in turn again contribute in diverse ways to other valuable capabilities. Bicycles can also be an effective means to improve access to education. Bicycles have had this effect in the Indian state of Bihar, where a project successfully made bicycles available to girls, which they could use to travel to school. Prior to the provision of bicycles many girls did not enrol in secondary school because their families could not afford public transport (Muralidharan and Prakash 2013). Gaining the capability to be educated is in turn crucial to expanding a range of other capabilities.

The previous examples all discussed the direct or indirect expansion of capabilities of people who could personally use a bicycle. However, rather than expanding the capabilities of their users, new technologies may also contribute to the capabilities of a wider group of people by changing existing social practices, or making new ones possible. There exists a Dutch development organization that runs Bike4Care projects, in which – among others – health workers visit people at home for health checks and counselling, using the bicycle as a means of transport.[6] Bicycles have also been remodelled to serve as ambulances. Such new or improved health care practices have the potential to expand the capability to remain healthy to a large group of people. The effect of technology on human capabilities may be even more indirect, through its (long-term) impact on a society's culture. According to Muralidharan and Prakash (2013), for example, the bicycle project not only led to increasing female school enrolment, but also to more safety for the girls in question as a result from cycling to school in groups. It also led to 'changes in patriarchal social norms that proscribed female mobility outside the village, which [also] inhibited female secondary school participation'. Several sources document that bicycles have in the past also played a significant role in the emancipation and empowerment of women in the global North.[7]

However, we should acknowledge that technological development projects may fail (Chapter 1 will develop this) and as a consequence not expand any instrumentally or intrinsically valuable capabilities. They may also have unintended and unexpected positive or negative effects on people's capabilities. Furthermore, the capability impacts of technologies may be mixed – they could expand one capability while at the same time reducing another, or just expand the capabilities of some group of people while reducing the capabilities of another group of people. In the latter case the introduction of the technology may raise an issue of distributive justice. Justice is, together with well-being and agency, one of the three values most extensively addressed in the capability approach literature.

One thing which may be good to make explicit at this point is that the way in which the term 'human capabilities' is used in the capability approach differs from the way in which this term – or similar terms – are used in other contexts. For example, 'human capital' is a term commonly used in innovation economics. It concerns the ability of individuals to be productive as labourers and contribute to economic value creation. The capability approach is interested in a wider range of abilities or capacities. It only takes an interest in human capital to the degree that it directly or indirectly improves people's life – and not just makes firms better off. Another common concern in innovation economics is the 'innovation capabilities' of firms or entire economic sectors. And development organizations are often working on 'capacity building' with local partner organizations, to increase the capability of these organizations to attract funding, manage development projects and so on. In both these cases the term refers to capabilities at a collective level. From the perspective of the capability approach one would ask whether increasing such collective capabilities or capacities contributes – either directly or indirectly – to expanding the capabilities of individuals to lead a flourishing human life. If they do, they have instrumental value for the ultimate end of improving people's lives. Figure 0.1 shows the distinctions made here. Whether collective capabilities can have intrinsic value is a topic of disagreement among capability scholars.

The capability approach as a lens to technology[8]

Technology has implications for well-being, agency and justice – three central values in the capability approach literature. The proposal made in this book is that the capability approach provides a powerful conceptual framework to assess and evaluate technology in terms of these values, which can

	Intrinsically valuable	**Instrumentally valuable**
Individual capabilities	Capability approach ←	Innovation economics
Collective capabilities	?	Innovation economics
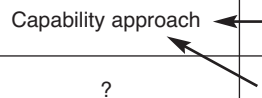
Figure 0.1 Different types of capabilities as research focus points

partly be understood in terms of valuable individual capabilities. Technology is of course a complex phenomenon and there is no agreement on its essence or nature. Throughout history and in different disciplines 'technology' has been defined and understood in a range of ways, for example as a product, a process or a form of knowledge (Mitcham and Schatzberg 2009). This book is not the place to discuss this in detail. Broadly speaking, the view of technology adopted is that it concerns a set of material artefacts, or systems consisting of such artefacts, designed to perform certain functions. Intuitively, there seems to be a close link between the nature of technical artefacts and what people are able to do and be, in other words: their capabilities. It is therefore somewhat surprising that until about a decade ago the capability approach had hardly been applied to technology. Sometimes technology is even completely overlooked, as in this theoretical overview article, which gives a detailed enumeration of capability inputs:

> For some of these capabilities, the main input will be financial resources and economic production, but for others it can also be political practices and institutions, such as the effective guaranteeing and protection of freedom of thought, political participation, social or cultural practices, social structures, social institutions, public goods, social norms, traditions and habits. The capability approach thus covers all dimensions of human well-being.
>
> *(Robeyns 2005: 96)*

Technology is not mentioned here as a capability input. Of course, Sen acknowledges, as we saw, that technical artefacts like bicycles can expand human capabilities. And in some other publications he mentions that techno-logical progress has an instrumental role to play in human development (e.g. Drèze and Sen 2002: 3). Yet until quite recently technology never received

any in-depth treatment in the capability approach literature. The first special-
ized publication on the capability approach and technology, more specifically
on ICT (information and communications technology), did already appear
at the end of the 1990s (Garnham 1997). It seems, however, that up to
roughly 2007 there were still fewer than a dozen other publications on the
topic. These publications were moreover largely unrelated, as they were
spread over different disciplines and journals. After that, there seems to have
been an exponential growth of work on technology and the capability
approach. An indication of this is that a bibliography compiled in early 2012
contained 79 publications that substantively engage with the topic, 91 per
cent stemming from 2006 or later and 53 per cent originating from 2010 or
later (Oosterlaken 2012b). This book will draw on this increasing body of
literature,[9] including my own work.[10]

Useful as the capability approach may be as a normative lens through
which to examine technology understood in this way, it has certain limit-
ations. Both the benefits and limitations will be addressed at various places
in the present book. However, it seems useful to discuss one major limitation
right at the start, namely that – as Robeyns (2005: 94) has pointed out – the
capability approach

> is not a theory that can *explain* poverty, inequality or well-being;
> instead, it rather provides a tool and a framework within which to
> *conceptualize* and *evaluate* these phenomena. Applying the capability
> approach to issues of policy and social change will therefore often
> require the addition of explanatory theories.

Likewise, the capability approach on its own is not able to explain why or
when technology contributes to poverty reduction, or when it exacerbates
existing inequalities. More specifically, it does not help us to understand the
different ways in which technology and human capabilities are or can be
related. It gives us a conceptual framework to evaluate, for example, the
outcome of technological development projects. We could apply the cap-
ability approach without using work from fields like science and technology
studies, design studies and philosophy of technology. This would however
mean that the technology in question can and will then only be discussed in
a generalizing or superficial way; it remains a black box. There would then be
an important limitation on one's ability to understand the impact of a
technological development project on human capabilities. One would not be
able to investigate in any detail if the choice of the technology, or the way in

which it was designed, or its embedding in socio-technical networks, plays an explanatory role in achieving the project outcomes. One might not even think of asking these questions, as one might not even be able to fully see their relevance.

Considering this limitation, it is not surprising that much of the recent work on technology and the capability approach have explored the compatibility of the capability approach with various theoretical perspectives on technology and engineering design. One's answer to the question of which perspectives can fruitfully supplement the capability approach will depend on one's purpose, but also on the general merits of these perspectives and theories. There is no single way to 'operationalize' the capability approach in the domain of technology and design. It should be noted though that it may not be inconsequential which supplementary technology accounts one chooses. Although making such a choice will generally speaking be unavoidable to operationalize the capability approach, it may sometimes also be a choice that is controversial. One also needs to be aware of the possibility that certain theoretical assumptions may not be compatible (Oosterlaken 2013). Throughout the book, a range of technology and design perspectives is discussed in relation to the capability approach.

Aims and structure of this book

The capability approach is a general conceptual framework, and countless different technologies exist and are applied in myriad ways. This book will provide little by way of concrete guidance for how to make any specific technology better contribute to human development. Rather, the overall aim of the book is to give the reader a solid theoretical basis to reflect on technology from the perspective of the capability approach. Although some engineers and designers may be motivated to plough through the many insightful books and articles of Sen, Nussbaum and other capability theorists, it is not realistic to expect this from all of them. It is hoped that this book will make a contribution to explaining the capability approach to this group in an accessible way. At the same time it may perhaps serve to introduce development scholars and other non-technologists to some of the complexities of making technology work for human development. More specifically, this book has four objectives. First, to examine the strengths and limitations of the capability approach as a critical lens to technology (book as a whole). Second, to put such a capability approach to technology in the context of some historical and current debates about technology and human

development (Chapters 1 and 4). Third, to argue that understanding the technology–capability relationship requires iteratively 'zooming in' on the design details of technical artefacts, and 'zooming out' to the embedding of technical artefacts in socio-technical networks (Chapters 2–3). Fourth, to show that various technology and design accounts may fruitfully supplement the capability approach (book as a whole).

One way to clarify the strengths and limitations of the capability approach, which is part of the first objective of this book, would have been to extensively discuss the criticisms it has received from philosophers, economists and other scholars. These include for example the criticism that the capability approach would be too complex to apply or operationalize. It would therefore not provide a realistic alternative to the standard economic approaches and methods (Sugden 1993).[11] An example of a criticism made by a philosopher (Pogge 2002) is that the capability approach would wrongly take *all* facts of interpersonal diversity as relevant to the issue of justice, and that it would insufficiently recognize the moral relevance of the causal origins of inequalities.[12] Such general criticisms have already been debated elsewhere and a proper assessment of their strength would take too much attention away from the focus of this book: the capability approach *as a lens to technology*. Another way to get a better understanding of the strengths and limitations of the capability approach would be to contrast it with alternative general development paradigms (such as the basic needs approach) or normative frameworks (such as the human right framework). Others have already made such comparisons (see e.g. Crocker 2008; Vizard *et al.* 2011), although not specifically applied to technology. Comparing such alternative approaches and paradigms with respect to their ability to help us reflect on technology would be interesting. Yet every book has limitations in scope, and the strategy chosen for this book is to focus on giving the reader an in-depth understanding of the capability approach in relation to technology. In order to do so the book draws on different disciplines that deal with technology: design studies, science and technology studies and philosophy of technology. The focus is on how technologies change the lives of individuals. Readers who are more interested in how innovation processes more generally contribute to human development are referred to a recent book by Hartmann (2014), which connects insights from innovation economics and the capability approach.

Chapter 1 examines three different, broad and general views on poverty reduction and technology – as presented by Leach and Scoones (2006) – through the lens of the capability approach. The first view is that

technologies can have a direct, worldwide impact on poverty ('the race to the universal fix'). The second view is that technologies contribute to economic competitiveness and growth, which in turn would lead to poverty reduction ('the race to the top'). The third view is one which emphasizes bottom-up, participatory technological development, taking into account varying local social, cultural and institutional realities (the so-called 'slow race'). The chapter will discuss one specific perspective that fits with the 'slow race' in more detail, namely the appropriate technology movement. This perspective on technology and development was very popular in the 1970s/1980s, and traces of its influence can still be found today. The chapter discusses what the capability approach has in common with the appropriate technology movement, but also how it could extend it. The chapter ends with a discussion about what is really core to the capability approach, and how much room this core leaves for different views on technology and human development.

Chapters 2 and 3 present a view which I have developed in previous work (Oosterlaken 2013). Arguably, both the details of design and the socio-technical embedding of technical artefacts are relevant factors in the expansion of human capabilities. Understanding the relation between technical artefacts and human capabilities therefore requires us to iteratively move back and forth between 'zooming in' and 'zooming out'. Zooming in allows us to see the specific features or details of design of technical artefacts (Chapter 2). Zooming out allows us to see how exactly technical artefacts are embedded in broader socio-technical networks and practices (Chapter 3). The capability approach is a conceptual framework that highlights certain values – especially well-being, agency and justice – and acknowledges that people may have very different yet legitimate views of the good life. These three values and the topic of the 'good life' will get explicit attention in both chapters. A connection will be made with various technology and design accounts, such as value sensitive design, participatory design, universal design, actor–network theory and pluralist versus system/network views of technology. The content of these two chapters has been substantially influenced by contemporary work in the field of philosophy and ethics of technology. Unfortunately there is presently still hardly any empirical work available which could serve to illustrate the ideas presented in these chapters in great detail. The emphasis is on making the connection between ideas in the capability approach and in a number of technology and design accounts. It is my hope though that these chapters will inspire further, more practical work and real-world applications in the future. Chapters 2 and 3 are, in contrast to Chapters 1 and 4, not

specifically focused on the global South – although some examples from a developing country context will feature in them. There is actually nothing in the capability approach that limits its application to contexts of poverty reduction and underdevelopment, and a considerable part of the capability approach literature indeed describes applications in the global North, or discusses issues that pertain worldwide. This also applies to the sub-body of literature on technology and the capability approach. For example, it has been used to discuss normative issues with respect to the design and implementation of robots to solve the problems of rising costs and personnel shortage in Western health care (Borenstein and Pearson 2010; Coeckelbergh 2012). There is furthermore no reason why reflection on technology in the global South could not, just like reflection on technology in the global North, benefit from a thorough theoretical basis. To a large degree this basis could be the same.

Chapter 4 does focus on the global South again, as it discusses the application of the capability approach in the domain of ICT for Development (ICT4D). It starts out with a discussion on whether there is anything special about ICTs, which would set them apart from earlier technologies which were introduced in developing countries. The next section will discuss various ways in which 'mainstream' ICT4D has been criticized from the perspective of the capability approach. The third section of the chapter discusses a case study, namely a project in which mp3 players and podcasts were introduced in a rural area in Zimbabwe. One of the attractive features of this case is that it illustrates the importance of both 'zooming in' and 'zooming out'. The fourth section pays particular attention to the values of well-being and agency in ICT4D initiatives, and the tension that may arise between them. This is done on the basis of the podcasting example and that of the telecentres. The latter are public ICT centres, for example in rural areas
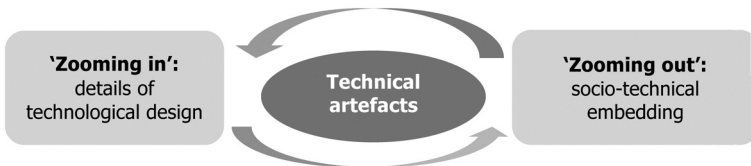

Figure 0.2 The technology–capability relationship: 'zooming in' and 'zooming out'

where private ICT access is still low, where people can go to use computers. The last section of Chapter 4 discusses the various ways in which the capability approach might be operationalized and used within ICT4D, with the aim of further illustrating the versatility of the approach.

Notes

1   Despite many commonalities between their writings on the capability approach, Sen and Nussbaum have each applied and developed the approach in their own way. For a discussion of the differences between their views on the capability approach, see e.g. Robeyns (2005) and part II of Crocker (2008). This book is to a large degree based on the work of Nussbaum, but will at various places also draw on the work of Sen.

2   Of course there are both practical and normative limitations to such freedom. Normative limitations arise, for example, as a consequence of issues of sustainability and intergenerational justice, and from the need to equally respect the freedom of others.

3   For a general, introductory textbook on the capability approach, and the human development approach more broadly, the reader is referred to Deneulin and Shahani (2009). A good introduction to the capability approach from a philosophical perspective is provided by Robeyns (2011).

4   See the film *Wadjda* (2012), written and directed by Haifaa Al Mansour, about a young girl in Saudi Arabia who wishes to cycle. Two months after the movie appeared, Al Mansour narrates in an interview that cycling became partially allowed for women. They are still not allowed to use bicycles as a means of transport in the city, but they can now use bicycles in parks for recreational purposes – provided that they are dressed decently and accompanied by a male relative while cycling (Bockting, 2012).

5   This example of washing powder was introduced by the philosopher Bernard William (1987) in response to Sen's work.

6   www.coop-africa.org/en/what-we-do/bike4care/265-health-workers-in-kisumu-kenya (accessed 19 January 2013).

7   In his historical study of bicycle development in nineteenth-century Europe Bijker (1995) shows that here as well – just as in Saudi Arabia – cultural norms were such that women were initially not allowed to use bicycles. He finds (p. 22) that in Europe 'the first cycles in fact reinforced the existing "gender order"', while they 'later became an instrument for women's emancipation'. See also Macy (2011).

8   This section is a revised version of a section in Oosterlaken (forthcoming).

9   For an extensive overview of the literature up to 2012, see Oosterlaken (2012a).

10   One limitation of the book is that it is based solely on literature in the English language, even though it is to be expected that relevant literature has also appeared in other languages. In Latin America, for example, there is a quite active network of capability scholars and some of them may have used it to reflect on technology.

11   For a discussion of this criticism, see Robeyns (2000).
12   For a critical analysis of and reply to Pogge's criticism, see Oosterlaken (2013b).

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