

1. Project title

Technology and Human Development - A Capability Approach

2. Summary

Some influential theories of distributive justice, fairness and equality, like that of John Rawls, discuss fair distribution in terms of shares of primary goods available to people. The main criticism of philosopher and Nobel laureate in economics Amartya Sen of these views is that it is not the goods that are ultimately important, but what they allow us to do and be, the kind of lives they enable us to live. Giving everyone a laptop or some other piece of technology is no good in and by itself, according to Sen's approach. Some people will be able to make good use of it and increase their level of functioning, but others who are illiterate or do not have access to reliable power supply cannot possibly convert their possession of the technology into anything useful in their lives. *Human functionings* and *capabilities* are therefore at the centre of Sen's work, referred to as the 'capability approach'. Although it has been widely adopted in development thinking, hardly any work has been done on the interrelations between the capability approach and technology. This is remarkable, since technology by definition aims at expanding human capabilities. This project investigates how the capability approach can be utilized in (thinking about) technological innovation and engineering design. The context of application for this project is innovation for the so-called 'Base of the Pyramid' (BoP) or the poor in developing countries. Case studies are taken from three engineering areas: ICTs, healthcare/medical technology and sustainable human settlements.

3. Principal researchers

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4. Institutional setting

Within the Netherlands, the project is embedded in:

- Faculty of Industrial Design Engineering (IDE, TU Delft)
- Faculty of Technology, Policy & Management (TPM, TU Delft)
- 3TU.Centre for Ethics and Technology (3TU.Ethics, in which the Department of Philosophy, Faculty of TPM, participates).

IDE is one of the largest in its field and has an excellent reputation, both in education and research. It comprises research from all disciplines relevant to the field, from social sciences (including management

sciences) to engineering. It has gained extensive experience with research for/with/in developing countries (www.io.tudelft.nl/bop). 3TU.Ethics (www.ethicsandtechnology.eu) is a joint research centre of the three technical universities in The Netherlands with an excellent track record in (multidisciplinary) research on ethics and technology. Its members have successfully completed many NWO projects in the past and in 2006 an international evaluation committee of the associated Dutch Universities (VSNU) acknowledged the research excellence of the philosophy departments involved. In this project, researchers from IDE and 3TU.Ethics closely collaborate with researchers from the Indian Institute of Science (IISc, see www.iisc.in).

5. Description of the proposed research

5.1 Societal relevance – Base-of-the-Pyramid innovation

Decades of traditional development aid have not solved the problems of the world's poor – including hunger, unemployment, disease, lack of shelter and education, gender inequity and environmental deterioration. New solutions are currently being explored, amongst others by the so-called 'Base of the (income) Pyramid' (BoP) movement. The central idea here is that entrepreneurial activity and making profit can go hand in hand with poverty reduction. This requires, says Prahalad (2004), innovation. While promising in many ways, some elements deserve further thought in order to realize its full potential to help reduce poverty:

- *One omission in current BoP thinking* is that insufficient attention is being paid to the engineering and design phase of innovation for the BoP (Thomas 2006; Kandachar and Halme 2007). Yet innovation scholars (Soete 2008) as well as development theorists (Leach and Scoones 2006) have argued for a 'new mode of innovation' for developing countries, one that is adaptive to local contexts, involves multi-stakeholder participation and is design-based - contrary to the traditional uniform, linear, natural science based innovation (with emphasis on international technology transfer).
- *Another critique of BoP initiatives* is that they focus too much on the reduction of *income* poverty, while they should aim more at the expansion of 'human capabilities' (Crabtree 2007). The 'capability approach' started as a criticism on welfare economics by Amartya Sen, but became an influential perspective on development. Development should – according to Nobel laureate Sen – aim at expanding people's human capabilities. Sen's work inspired – amongst others – the creation of the UN's Human Development Index. We should not measure a country's development solely in terms of GNP and likewise we should not judge innovation for the BoP solely in terms of income effects for the poor, but also in terms of effects on human capabilities. Innovative technology – e.g. ICTs, medical equipment, energy technology - is potentially a powerful tool for directly expanding human capabilities – but this requires appropriate innovation and design.

This research project will address these lacunas by using the capability approach as a critical conceptual framework for the assessment, design and evaluation of innovative technology for the global poor. Those who are responsible for the design and introduction of technology for developing countries need to think more about the way it affects the capabilities of the poor. Those who want to reduce global poverty need to think more about how technology can be deployed for expanding human capabilities. Although this may seem a straightforward idea, the implications still have to be traced all the way through.

5.2 Theoretical framework – the capability approach

Some influential theories of distributive justice, fairness and equality, like that of John Rawls, discuss fair distribution in terms of shares of primary goods available to people. The main criticism of economist Amartya Sen (1999) and philosopher Martha Nussbaum (2000) is that it is not the goods that are ultimately important, but the kind of lives they enable us to live, what they allow us to do and be. Giving everyone a slice of bread of equal size may amount to an unfair distribution, since some people may need more food because they are recovering from an illness or because they are pregnant. Giving everyone a laptop or some other technology is no good either in or by itself. Some people will be able to make good use of it and increase their level of functioning, but others who are illiterate or do not have access to reliable power supply cannot convert possession of the technology into anything useful in their lives. Human functionings and capabilities are thus at the centre of Nussbaum's and Sen's thinking, referred to as the 'capability approach' (CA).

Capabilities have been described as "what people are effectively able to do and be" or the (positive) freedom that people have "to enjoy 'valuable beings and doings'", to lead the lives they have reason to value. These beings and doings are called 'functionings' by Sen. Examples of functionings are working, resting, being literate, being healthy, being part of a community, being able to travel and being confident. "The distinction between achieved functionings and capabilities", so Robeyns (2005) explains, "is between the realized and the effectively possible; in other words, between achievements on the one hand, and freedoms or valuable options from which one can choose on the other". According to Alkire (2005) one reason to focus on capabilities instead of functionings is that we value free choice and respect people's

different conceptions of the good life. Two persons may have the same level of nutritional functioning: "A person who is fasting is in a state of under nutrition, which may seem very similar to a person who is starving. But in the one case, the fasting person could eat and chooses not to; whereas the starving person would eat if she could." The CA thus recognizes the importance of both 'well-being freedom' and 'agency freedom'. The latter acknowledges that people pursue not only their own well-being, but may also choose to pursue other ends (like the well-being of others or following moral norms).

Several aspects of the CA are discussed by authors. One debate is about which capabilities matter and who (how, when) is to decide about this. Whereas Nussbaum comes up with a concrete and – so she claims - universally applicable list of important capabilities, Sen has always refused to endorse a specific list of capabilities, or to set priorities among different capabilities. His reasons are that the proper list of capabilities may depend on purpose and context and should be a result of public reasoning and democratic deliberation. The question of 'operationalisation' has, understandably, received quite some attention. How do we expand people's capabilities?

5.3 Scientific relevance – technology & human capabilities

A large body of literature exist nowadays on the CA and it has inspired (policy) debates in many areas, e.g. in health care, nutrition, livelihoods, education and gender inequality (Alkire 2005, 2002; Comim, Qizilbash, and Alkire 2008; Robeyns 2006). There is, however, little work on the approach in relation to technology and design. This is remarkable, since technology by definition aims at expanding human capabilities. We feel that the interrelations between human capabilities and technology need to be addressed in order for the CA to realize its full potential as a practically relevant ethical theory concerned with improving the fate of the global poor in the century of high technology. Two of the applicants proposed this in a presentation at a workshop with Martha Nussbaum on December 15th 2008 (sheets at www.hse.fi/bop). She agreed that the theme 'technology, design and capabilities' should be further explored. Her suggestion was that TU Delft will organize one of the annual conferences of the Human Development and Capability Association on this topic.

5.4 Research questions

The central research questions are:

- How can the capability approach (CA) be applied to technology and innovation - especially in developing countries, with the purpose of improving the situation of the poor?
 - A. How should the interrelations between technology and human capabilities be understood and explicated?
 - B. How can the CA be utilized in methods and practices of engineering design, in view of technology for development?
 - C. How can the CA be utilized in the methods and practices of assessment and evaluation of technology / innovation projects for development?
- How and in which sense would sound answers to A/B/C lead to improvement of our thinking and best practices of technology and development, compared to other approaches which are currently in use?

Three subprojects correspond to these three research questions. Project A is mainly of a theoretical / philosophical nature. Projects B and C are methodological projects in the area of engineering design and innovation. They are embedded in concrete case studies that will provide invaluable input for answering the research questions. Extensive usage will also be made of empirical research which is done by others in the area of technology and development (from disciplines such as cultural anthropology - e.g. Tenhunen 2008) and available meta-analyses.

5.5 Description subprojects

A - Theory: technology and human capabilities

Project A will address several more theoretical and philosophical issues, including:

- Conceptual analysis and comparison of discourses (terms, concepts and background views) within a) the capability approach (CA) and b) technological innovation and engineering design.
- Applied ontology of the CA (human capabilities and functionings) in relation to the ontology of engineering (artefacts having functions, expressions e.g. "nuclear capability"). Regarding the analysis of engineering and engineering methodology the TU Delft philosophy department has already successfully conducted innovative and internationally acknowledged work (e.g. Vermaas and Houkes 2006; Houkes et al. 2002).
- Critical reflection on the interaction between technology and human capabilities. For example related to individual/collective/external capabilities (Foster and Handy 2008), complicated capability effects of

technology (like long-term versus short term, expanding some while contracting others, well-being versus agency freedom, see also case examples)

- Tenability of claims of non-paternalism and neutrality towards the good life in the CA, considering the fact that many capabilities would not be possible without technology; within the philosophy of technology and within science and technology studies (STS) people have argued that technology is *not* neutral with respect to the good life.

B - Design application: 'capability sensitive design'

If we conceive of technologies in terms of their effect on the capabilities of people, the capability approach (CA) needs to be made an integral part of engineering design, both in terms of methodologies and general awareness. One of the applicants has labeled this 'capability sensitive design' in an article introducing the approach to the design community and sketching a research agenda (Oosterlaken forthcoming). This project includes:

- The appropriateness - from the perspective of the CA - of existing design theory, methods and practice, e.g. value sensitive design (van den Hoven 2007), universal design and participatory design. Universal design, for example, seems to share some elements with the CA (Oosterlaken forthcoming).
- Special attention for participatory design, considering the 'inherent' link between the CA and participatory methods (Frediani) and the added value that the CA is expected to have here (Oosterlaken forthcoming). This also requires looking at 'capabilities to design' of the stakeholders (Dong 2008).
- The development and testing of improved or new design methodologies, based on the CA - with special emphasis on developing countries / the global poor.

C - Policy application: capability-technology assessment & evaluation

First attempts have already been made to apply the capability approach (CA) to the assessment and evaluation (e.g. Gigler 2004; Murphy and Gardoni 2006; González, Aristizábal, and Diaz 2008) of projects concerning technology/innovation. This part of the project builds on that work and includes:

- Articulation of criteria for "appropriateness" – from the perspective of the CA - of existing methods and practices.
- Special attention for participation (e.g. Krämer and Belz 2008).
- The development and testing of improved or new assessment and evaluation methodologies, based on the CA - with special emphasis on developing countries / the global poor.

5.6 Research methods/approach

Project A uses standard methods of analytical philosophy, e.g. conceptual analysis, which comprises the analysis of the discourse of participants on the basis of the study of the relevant literature and participation in the discussion with relevant parties and individuals, identification of the crucial concepts and the concepts that give rise to controversy; the clarification of these by critical reflection; the testing of the outcomes of the results of this process by applying them to the ongoing debate and the cases chosen; presentation of findings for critical discussion with the relevant (research) community. Projects B and C provide an important platform for doing so.

Projects B/C start with an extensive literature review of existing design / evaluation / assessment methodologies (and of the small body of literature already available on technology/design and the capability approach). It will also review relevant literature for the case studies in the project. The case studies play an important role in projects B/C, the latter comprising a range of methods (interviews with stakeholders, review of documentation, etc). Case experiments – e.g. with groups of (design) students – are part of testing new or improved methodologies. The research protocols, the combination of methods and a working plan will be established in the first year of these two projects. Students doing their M.Sc. thesis research in a developing country may contribute to the case studies (IDE has extensive experience with this, see Kandachar et al. 2007).

Participatory qualitative methods are used throughout the research process. For example, for each of the three main case studies a session in the Group Decision Room (GDR) will be scheduled with members of the valorisation panel, other stakeholders and researchers from different disciplines. The GDR is an electronic environment for facilitating brainstorming and casting votes on issues. Researchers from the philosophy department have successfully introduced this type of research utilizing the GDR in earlier NWO projects (e.g. Zwart et al. 2005).

5.7 Embedding in technological cases

Since we would like to reach some conclusions about the applicability and added value of the capability approach (CA) for innovation and technology in general, abstracted from possible peculiarities in the application to a specific domain, case studies are conducted in a number of different engineering domains:

1. *ICT*

Due to the wide range of application, ICTs have the potential to contribute to many different human capabilities. Since expectations of the contribution to poverty reduction are often extremely high and perhaps unrealistic, critical reflection is expected to have added value (Zheng 2007; Selinger 2008). Moreover, the occasional publications on technology and the CA focus for a large part on ICT (e.g. Gigler 2004; Johnstone 2007; Zheng 2007). Finally, ICT and ethics is an area in which main applicant Van den Hoven is an internationally recognized expert.

2. *Medical/healthcare technology*

Health is perhaps “the sector most in need of what could be called a bottom of the pyramid research re-prioritization” (Soete 2008). Moreover, this area is very relevant for the quality of life of the poor and for the millennium development goals. Finally, several design/BoP projects in the healthcare/medical sector have already been carried out by the Faculty of IDE (Kandachar et al. 2007). Co-applicant Kandachar recently received a substantive grant to continue his work in this area.

3. *Sustainable human settlements*

When we think of the ‘real’ BoP – the poorest of the poor – we find that many capability failures are connected to their living environment. Possibly interesting issues: short-term versus long-term capabilities (related to sustainability), agency (e.g. faked helplessness in Tsunami areas to increase aid received) and the role of adaptive preferences (related to awareness/exposure to urban lifestyles). The first attempts to connect the CA to this area - which includes building, sanitation and energy – have already been made (González, Aristizábal, and Diaz 2008). Co-applicant Mani has much experience in this area.

The project will use three main cases, one in each engineering area, which are relevant and interesting for all three PhD projects (although each PhD project also include other, minor cases). In the first two areas the research team proposes the following two cases:

1. *Rural ICT telecentres*

Ratan and Bailur (2007) critically discuss rural telecenters, which have received a lot of funding and support over the past years. These centers are generally seen as empowering, giving people access to all sorts of information (health information, job openings, etc) and by acting on that information people gain greater control over their lives. All sorts of capabilities can be expanded in this way. “Yet”, they say, “research on telecentres increasingly illustrates discrepancy between ‘development’ intentions and usage”. People may also use the telecentres for other purposes, like entertainment. Money for development purposes is thus invested in ICT projects that seem questionable in terms of human capabilities expansion and the intentions of the NGOs, but it is the villagers themselves that make the decisions on how to spend their time and how to use the telecentres. ‘Agency freedom’ and ‘well-being freedom’ – concepts from Sen’s version of the capability approach (CA) - clash here.

Although the CA offers conceptual tools for interpreting this situation, it is not immediately clear how we should evaluate it and proceed. We should not blindly accommodate the possibly ‘adaptive’ preferences of the villagers. Yet we should also not completely ignore the importance of agency freedom, even though this comes at the expense of well-being freedom. “The agency welfare debate”, Raitan and Bailur argue, “gets even more complicated when it involves more than one individual.” We should probably also acquire more insight into how the conversion from resources (ICT equipment and information) into capabilities and decisions takes place or is hindered into specific contexts and how these context influence deliberation of people on what to pursue. As Raitan and Bailur note, the context of uncertainty in which many poor live, may lead to different trade-offs between valuations of the present and the future: “We do not claim that people are not interested in their own welfare, but that this value is hard to see and turn into tangible welfare gains in ICTD projects, given the numerous factors that influence the translation of welfare information into welfare outcomes in developing country contexts today.”

2. *Ultrasound technology for rural India*

The Faculty of Industrial Design Engineering (under guidance of prof. Kandachar, together with Philips Healthcare) is currently planning an innovation project for the BoP with the aim of simplifying ultrasound equipment, so that uneducated rural health workers in India and in China will be able to operate it. Ultrasound images will be send to a regional/urban hospital with the help of ICT, where skilled doctors are able to interpret the images and give medical advice. In India there is, however, an important downside to the usage of this technology; Ultrasound images disclose whether a fetus is a girl (often unwanted) or a boy. The technology has thus led to a large number of abortions on female fetuses.

Technology has complicated capability effects here. Positive for mother and child is preventing premature death and improving health. For individual families avoiding dowry by not having another daughter may lead to a better financial situation, which may contribute to improving different capabilities. On the negative side: sex-selection enabled by ultrasound technology may be another way to continue a culture that denigrates and discriminates women, which affects many capabilities of women negatively. The growing demographic gender imbalance also has as a consequence that many young boys/men will be unable to find a spouse and start of family, which affects capabilities in the area of emotions and affiliation (capabilities 5, 7 in Nussbaum's list).

Not only should we examine how technology and capabilities interact in this context, there is also a need to investigate how design may play a role as part of not only the problem, but also the solution. Gender-selective abortion is forbidden by Indian law, but it has proved very difficult to enforce this law. A 'capability sensitive design' solution may entail ultrasound technology being designed in such a way that images only show certain things (like the position of the fetus in the womb) and not others (like the genital areas of the fetus). Modern ICT and pattern recognition techniques might play a role here, automatically identifying genital areas in an image and blurring these (van den Hoven and Oosterlaken 2008).

Only after the valorization workshop it was decided to add the third engineering area. The research team has thus not yet decided on the major case in this area. This will be done in year two of the project.

5.8 Cohesion of the research and constituting elements

Cohesion between the three PhD projects

The three subprojects benefit from each other's findings and results in several ways, e.g.: For project A the other two projects offer the opportunity to get feedback from professionals and stakeholders on philosophical ideas and dilemmas. Project B, in attempts to come up with suitable 'capability sensitive design' methods, can benefit from the applied ontological work done in project A (functional decomposition being an important method in engineering). And since projects B and C both aim for the development of appropriate *participatory* methodologies in their field, they may benefit from sharing their information, ideas and results.

Case studies in different engineering areas & cohesion

Case studies are executed in three different engineering areas, while none of the senior applicants has extensive expertise and experience in *all three* areas. It is, however, expressly not the intention of this project that each of the three PhD students focus on only one of the engineering areas. Good communication and intensive collaboration ensures that all three PhD students have access to the expertise of all three senior applicants. The institutional embedding of the project is also helpful in this respect – both the Faculty of Industrial Design Engineering and the 3TU.Centre for Ethics and Technology are used to running project in several different engineering areas. Finally, it should be noted that there are good reasons to address three engineering areas instead of just one.

5.9 Integration humanities/social sciences/engineering

Experts on the capability approach have stated that it is "highly interdisciplinary" in nature (Robeyns 2005), 'operationalisation' requires intensive collaboration with experts in the specific domain of application (Alkire 2005), in this case engineering and design. The institutional setting of the project and resumes of the researchers provide excellent conditions for realizing the desired integration. The project includes subprojects in the humanities (A) and social sciences (B/C) that benefit from each other's results and will be able to connect to engineers through the case studies, participatory research methods, and methodologies that will be developed (outcome). Of course, good project coordination is also necessary to make integration a success.

5.10 International orientation and collaboration

Firstly, the content of the research project itself is thoroughly internationally oriented, with its focus on developing countries. Secondly, the project is a joint effort of TU Delft and the Indian Institute of Science and all three PhD students are scheduled to spend some time abroad. Thirdly, the project has an internationally oriented valorization panel. Finally, the applicant's scientific network allows the project to draw upon internationally recognized experts in relevant areas. For example, the following researchers have expressed their interest in being involved in discussions concerning this project:

- *Dr. ir. Richard Goossens*, Medisign (Product Development & Research in Health Care), Faculty of Industrial Design Engineering, TU Delft, the Netherlands (www.io.tudelft.nl/medisign)
- *Prof. dr. B. Gurumoorthy*, CPDM (Centre for Product Design & Manufacturing), Indian Institute of Science, India (<http://cpdm.iisc.ernet.in/>)
- *Prof. Harishchandra Hebbar*, Director 'Manipal Centre for Information Science' & BoP Chair, India (http://www.grassrootinnovations.org/BoP_engagements/harishchandra_hebbar.htm)
- *Prof. dr. Melissa Leach*, STEPS Centre (Social, Technological & Environmental Pathways to Sustainability), Institute of Development Studies, University of Sussex, UK (<http://www.steps-centre.org/index.html>)
- *Dr. Evan Selinger*, Department of Philosophy, Rochester Institute of Technology, USA (<https://people.rit.edu/emsgsh/>)
- *Dr. Randy Spence*, OPHI (Oxford Poverty & Human Development Initiative), University of Oxford, UK (www.ophi.org.uk)

6. Social valorisation

Researchers in this project plan to work closely together with relevant actors (policy makers from ministries, people from development NGOs, etc). The following people have agreed to be part of the project's 'valorisation panel'. The idea here is to ensure the social relevance of the project and the dissemination of research results by closely collaborating with these actors both during and after the project.

Name	Organisation
Aloysius. P. Fernandez, Executive Director +91-(0) 80-25352028	Myrada (http://www.myrada.org) India NGO managing rural development programmes
Jasper Grosskurth, Project leader 'Technology in Africa' grosskurth@stt.nl +31 (0)70 3029832	STT (Stichting Toekomstbeeld der Techniek) (http://www.stt.nl/STT_Home.aspx?pgeld=242) The Netherlands Netherlands Study Centre for Technology Trends
David Grimshaw, Head New Technologies program David.Grimshaw@practicalaction.org.uk +44 (0)1926 634 473	Practical Action (www.practicalaction.org) UK (head office) + several country/region offices Development NGO specialized in pro-poor technology
Christian Hogenhuis, Officer Sustainable Development Research ct.hogenhuis@stichtingoikos.nl +31 (0)30 2361 521	Oikos (www.stichtingoikos.nl) The Netherlands NGO stimulating changes for sustainability and justice
Manjunatha Maiya, Project Manager manjunatha.maiya@philips.com +91 820 2925033	Philips BoP Office (www.grassrootinnovations.org/BoP_engagements/manjunath_maiya.htm) India Company working on innovation for the BoP
Anne-Marijke Podt, Officer Monitoring & Evaluation ampodt@iicd.org +31 (0)70 311 73 11	IICD (International Institute for Communication and Development) (www.iicd.org) The Netherlands NGO specializing in ICT as a tool for development
Dr. Shailaja Ravindranath, Regional director, CEE South	CEE (Centre for Environment Education) (www.ceeindia.org) India NGO with experience in technology-dissemination and access/contact/interaction with deprived sections of society
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7. Brief curriculum vitae of project leader

Jeroen van den Hoven is full professor of Moral Philosophy at Delft University of Technology and scientific director of the 3TU.Centre for Ethics and Technology (www.ethicsandtechnology.eu). He has specialized in ethics and ICT. One of his main research interests is 'value sensitive design'.

Van den Hoven is Editor in Chief of the journal *Ethics and Information Technology* (Springer) and Founding Chair of the CEPE conference (Computer Ethics Philosophical Enquiry). He is member of the editorial board of *Information, Computers and Society* (Routledge) and the *Journal of Information, Communication and Ethics in Society* and consulting editor of *Episteme*. He is – together with Seumas Miller and Thomas Pogge - Editor in Chief of The Ethics Reference Project (TERP), Springer's new On-line Encyclopaedia of Applied Ethics (<http://refworks.springer.com/ethics>).

Van den Hoven has received several grants from NWO on Ethics and Information Technology and related subjects. These include grants for the projects "Quality of Care, Patient-Centeredness, and Value-Sensitive Design in ICT" and "Responsibility, Images and Architectures: Medical Images in the Health Care Process".

Van den Hoven is member of the IST Advisory Group to EU Commissioner Reding for ICT and New Media. He has also been advisor to the Dutch Government in various roles and has worked together with IT industry (a.o. SUN, IBM and Getronics).

8. Literature

Selection of publications from project leader

1. van den Hoven, Jeroen & Oosterlaken, Ilse. 2008. *Technologies and Human Capabilities*. Paper presented at the workshop "Well-being in Low-Income Countries" with Martha Nussbaum, December 15th 2008, Helsinki School of Economics, Finland.
2. van den Hoven, Jeroen & Emma Rooksby. 2008. "Distributive Justice and the Value of Information: A (Broadly) Rawlsian Approach". In: *Information Technology and Moral Philosophy*, edited by J. van den Hoven and J. Weckert. Cambridge: Cambridge University Press.
3. Van den Hoven, Jeroen & John Weckert, eds. 2008. *Information Technology and Moral Philosophy*, Cambridge Studies in Philosophy and Public Policy. Cambridge: Cambridge University Press.
4. van den Hoven, Jeroen. 2008. "Moral Methodology and Information Technology". In: Tavani & Himma (eds.). *Handbook of Computer Ethics*. New York: Wiley.
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6. van den Hoven, M.J. 2007. "Towards Ethical Principles of Designing Politico-Administrative Information Systems". In: John Weckert (ed). *Computer Ethics* (Series: The International Library of Essays in Public and Professional Ethics). Ashgate, London. pp. 193-215.
7. van den Hoven, M.J. 2005. "E-Democracy, E-Contestation and the Monitoral Citizen". In: *Ethics and Information Technology*, 51-59.
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9. Lampe, Doupi & Van den Hoven, Jeroen. 2003. "Internet Health Resources: from Quality to Trust". In: *Journal of Information Methods in Medicine*, no. 2 (2003), pp. 134-143.
10. van den Hoven, M.J. 2000. "Privacy and Health Information: The Need for a Fine-grained Account." In: *International Journal for Quality in Health Care* 12(1): 5-6, 2000.

Key publications from international literature

1. Comim, Flavio, Mozaffar Qizilbash, and Sabina Alkire, eds. 2008. *The Capability Approach; Concepts, Measures and Applications*. Cambridge: Cambridge University Press.
2. Foster, James E., and Christopher Handy. 2008. *External Capabilities*. In OPHI Working Paper Series no. 08. Oxford: Oxford Poverty & Human Development Initiative (OPHI).

3. Gigler, Björn-Sören 2004. *Including the Excluded- Can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach*. Paper presented at the 4th International Conference on the Capability Approach. University of Pavia, Italy.
4. González, Andrés Hueso, Alejandra Boni Aristizábal, and Rafael Monterde Diaz. 2008. *Potentialities of the Capability Approach in Impact Assessment of Technology-based Development Aid Projects: The Case of Micro Hydro Power in Andean Bolivian Communities*. Paper presented at the Human Development and Capability Association Annual Conference 2008. India, New Delhi.
5. Johnstone, Justine. 2007. "Technology as Empowerment: A Capability Approach to Computer Ethics". In: *Ethics and Information Technology* 2007 (9):73-87.
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9. Summary for laymen (in Dutch)

Wordt armoede in de derde wereld opgelost door het verspreiden van laptops? Sommige armen zullen er ongetwijfeld goed gebruik van maken. Maar als je bijvoorbeeld analfabeet bent of geen toegang hebt tot een betrouwbaar elektriciteitsnetwerk, dan zul je niet in staat zijn om dit hightech bezit om te zetten in een daadwerkelijke verbetering van je leven. Dit is een concreet voorbeeld van een discussie die in de filosofie gevoerd wordt: gaat het bij mondiale rechtvaardigheid om een eerlijke verdeling van primaire goederen, of eerder om wat ze ons daadwerkelijk in staat stellen te doen en te zijn? Het laatste, zegt econoom en filosoof Amartya Sen. Hij stelt menselijke capaciteiten/mogelijkheden of 'human capabilities' centraal. Technologie is bij uitstek een middel dat bedoeld is om deze te vergroten, ook in de derde wereld. Dit klinkt misschien vanzelfsprekend, maar niet alle technologie is daar even succesvol in. Wie bezig is met het introduceren van nieuwe technologie in ontwikkelingslanden zou meer moeten nadenken over hoe deze technologie waardevolle 'human capabilities' beïnvloedt. En wie streeft naar het bestrijden van armoede - in termen van meer mogelijkheden voor de armen om hun eigen leven vorm te geven - zou meer moeten nadenken over hoe technologie ingezet kan worden voor dit doel. Kortom, de implicaties Sen's 'capability approach' voor technologie en innovatie voor ontwikkelingslanden moeten beter doordacht worden. Hoe kunnen ontwerpers en beleidsmakers de 'capability approach' toegepassen en hoe kan zulke technologie bijdragen aan het verbeteren van het lot van de armen?

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