

Technology and (Dis)Empowerment

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Technology and (Dis)Empowerment: A Call to Technologists

AADITESHWAR SETH

Indian Institute of Technology Delhi and

Gram Vaani Community Media



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Endorsements

If you want to use information technology to make a positive difference in the world, then you need to read this book. Aadi Seth combines careful analysis of the interplay between technology design and socio-political processes with a wealth of practical experience to identify key challenges that efforts around IT for Good will always have to face.

– *Andy Dearden: Professor (Emeritus) Interactive Systems Design, Sheffield Hallam University*

Given the enormous influence and control of technologies over our lives, an ethical enquiry into their development, use and ownership is of vital importance. This book provides an incisive account of how state and market-led technologies have exacerbated socio-economic and environmental injustice, and conversely, how technologies based on the ethics of plurality, diversity, power-based equality, freedom and participation can help the movement towards justice and sustainability. Seth's call is not for rejecting technology, but for paradigm shifts towards more socially engaged technology and technologists.

– *Ashish Kothari: Kalpavriksh, Vikalp Sangam and Global Tapestry of Alternatives*

Professor Aaditeshwar Seth has spent years developing technologies through Gram Vaani, a social enterprise delivering a voice-based social media platform in northern India. Based on wide-ranging scholarship and hard-won experience, he counters market values with an approach to social impact that takes ethics and socio-technical theories seriously. If you're a technologist hoping to contribute to social good, this book will keep you honest!

– *Kentaro Toyama: Professor, School of Information, University of Michigan*

What comes out most importantly in the text is Aadi's two-fold firm conviction – one, that a technological community committed towards social good is indeed possible; and two, that dividing lines across technologists and ordinary people can be bridged, and this is what he has argued for. I hope that the technological community engages with these arguments.

– *Rahul Varman: Professor, Department of Industrial & Management Engineering, Indian Institute of Technology Kanpur*

For Gram Vaani, Stuti, and Iram.

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About the Author

Aaditeshwar Seth is an Associate Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Delhi, and co-founder of the social technology enterprise Gram Vaani. He is passionate about building appropriate technologies and participatory tools that can empower marginalized and oppressed communities to collectivize and voice themselves. Several million people have directly touched these technology platforms. Over 150 development organizations worldwide have drawn upon the work done by Aaditeshwar's team at Gram Vaani and his students from the ACT4D (Appropriate Computing Technologies for Development) research group at IIT Delhi. Many elements of their work have also been adopted by government departments and have influenced the use of technologies for development in the social sector. He is a recipient of the ACM SIGCHI Social Impact Award for 2022.

Foreword

The use of digital technologies has transformed much in the world over the last three decades. However, has it made the world better? Has it reduced or increased inequalities? Have the world's poorest and most marginalized really benefitted? This wide-ranging and fascinating book seeks to address these and other crucial questions about the role of digital technologies in society, and aims to suggest ways through which positive changes can be implemented to make the uses of these technologies fairer and more equal.

The book is rare in the ways through which it crosses boundaries: written by a computer scientist it explores the relevance of social and political-economic theory; crafted by an Indian, it draws heavily on European literature. Much of the theoretical framing is thus situated within Aaditeshwar Seth's explorations of the works of European authors such as Marx, Foucault, Castells, Latour, and Gramsci; his basic demand for a paradigm shift in thinking about these issues likewise draws heavily on the USA's Kuhn's notion of scientific revolutions. His book is also enriched through a combination of this conceptual research with the experiential evidence drawn from his own practical engagement on the ground.

The potential agents of change for Seth are the technologists themselves. These are for him the engineers, designers, researchers, and managers involved in the digital technology sector. The book is intended to provide them all with a framework that can help change their practices – if only they will listen. He takes the reader on a journey that begins with understanding the importance of social goods underlain by an ethical foundation embedded within the traditions of humanism. The book then explores why traditional design processes have their limitations, and the need to change existing power structures so that they can instead be shaped to create more equal societies. He hopes that no technologist would want their labour to lead to harmful outcomes, and thus explores the structures and ideologies that limit their potential to design and implement projects that can be considered to be socially good.

This is not just a reflective and interpretative framework; unlike so many other recent academic works in the field it also has a profoundly normative stance. It suggests what should be rather than just what is. Indeed, the word 'should' is mentioned 178 times in the book's 220 pages! In a challenging account of ways through which disempowering 'paradigms' can be overcome, he suggests 17 questions that all technologists could think about if they really do wish to bring about 'good' change (pp. 158–159). These might usefully be stuck on office walls (in the real world) or embedded in software and posted on social media used by

technologists (in the virtual world) to serve as reminders of the role that they as individuals can indeed play in making the world a better place.

Throughout, the book draws on specific examples and case studies, mainly drawn from Seth's own experiences. At various points in the book, he thus highlights the many challenges associated with the introduction of the Aadhaar unique identity system in India. He also draws extensively on the work that he has led in developing Mobile Vaani (supported mainly through Gram Vaani of which he is a Co-Founder), which is a federated network of voice-based participatory media platforms intended for less-literate users to share and discuss common concerns and solutions with each other.

In short, this book deserves to be widely read. It combines the author's passion and enthusiasm for the potentials of digital tech to be used wisely to help create better and more equal societies, with his understanding and realization of the many challenges that have to date prevented this from happening. Technologists across the world, and especially in India, are well placed to learn from and work with him, to begin to craft that better society.

Tim Unwin
26 January 2022

Tim Unwin CMG is Emeritus Professor of Geography and the founding Chairholder (since 2007) of the UNESCO Chair in ICT4D at Royal Holloway, University of London. He was formerly Secretary General of the Commonwealth Telecommunications Organisation (2011-2015) and Chair of the Commonwealth Scholarship Commission (2009-2014). His books include *Reclaiming Information and Communication Technologies for Development* (OUP, 2017) and his edited *Information and Communication Technology for Development* (CUP, 2009).

Preface

This book has emerged from confronting what appears to be a prevailing absurdity in the world today. We are surrounded by social problems of poverty, inequality, the environment, and many others, yet technology is scarcely deployed to directly address these problems. Technologists are more excited with getting advertisement predictions correct, or creating more addictive technologies, or improving technology infrastructures with little reflection on the uses to which the infrastructures are applied, and they assume that somehow magically these innovations will make the world a better place. Many of these innovations may however be entirely unnecessary, or may even harm users and society in general. Yet the world seems to be caught in a paradigm paralysis of continuous technology innovation without a moral compass to define worthwhile purposes of the innovations. A marginal category has indeed emerged of technologies for *social good*, but this space has remained small so far even though social good should have been the primary goal of technologies from the start. Even within this marginal category, although a growing brigade of technologists seem to be stepping in to address various prevailing social problems, they often get it wrong and create technologies that disempower the people they were meant to support. Yet the persistence of many such do-gooders remains unshaken. Voices and systems that would be truly empowering for people are sidelined in the presence of an orchestrated hype of buzzwords such as digitization, artificial intelligence, Internet of Things, smart cities, digital financial inclusion, etc., and their associated technologies are often deployed without contextual considerations which invariably worsens the entrenched structures of inequality.

What explains this absurdity of the world, of society, of technologists? How do well-meaning technologists end up building systems that harm people? Why does it always seem like an uphill battle to do what clearly seems to be the right thing? What should change so that genuine social good which avoids and prevents exploitation and disempowerment becomes the unanimous goal for technologists and society to pursue? I have been trying to walk this path for nearly a decade and a half of using technology to address social problems, and these questions have come up time and again. They come up in teaching where I feel we are failing to nurture a desire among students to use their skills for the wider benefit of society and to critically question the impact that their work has on society. They come up with our work at Gram Vaani, which has been incredibly difficult to scale in the presence of hype and problems created by other technologies, and has also humbled us with the complexity of bringing positive change in the lives of people. The

questions also come up in professional research circles where research communities such as Information and Communication Technologies for Development (ICTD) that have drawn attention to problems created by technology have continued to remain small, while mainstream technology research continues vigorously to innovate systems with little interest in governing how these innovations get used. In my attempt to find answers to these questions in books, papers, and from my own experiences, I would not say that I have been especially successful, but I do feel much better situated now to understand the absurd ways of the world and I am convinced of two things.

First, overcoming these absurdities requires a paradigm¹ shift in how technologies are designed and managed. Technology design and management should be done with social good as the primary goal. The current paradigm of innovation which is driven by markets instead of morals, focussed on narrow values such as cost and time efficiency, is inadequate to solve important social problems. Second, to bring about a paradigm shift towards thinking of technology as a tool for social good requires the technologists to change themselves, that is, embrace a change from within – in their ethos and ways of working and thinking, rather than being guided by external regulations or value-less institutions like markets. This is why this book is addressed to technologists – the people who design, build, manage, and research technologies – to understand the current paradigm where technology often disempowers the weak, discover new rules and methods that an alternate paradigm of empowerment and equality should adopt, and build a strategy to bring about this paradigm shift. My hope is that these thoughts can be useful for technologists who, like me, may be feeling just as perplexed in seeing their labour leading to outcomes that at heart feel wrong, and join hands in charting a road where technologies are used appropriately and unanimously for social good.

This book is not a criticism of technology. Technology has indeed led to significant progress in building a healthier, empathetic, and more connected world. My attempt, however, is to understand what factors shape the outcomes that arise from technology, and how can they be controlled by technologists and society, so that disempowering effects can be avoided. It is not a recipe through which technologists can always align their work with social good, but some ideas and pathways outlined here may help us together discover better ways to move forward.

¹I use the word *paradigm* in the same sense as Thomas Kuhn introduced in *The Structure of Scientific Revolutions*, as the dominant techniques, values, rules, and theories, which identify a particular framework in which science or technology is developed.

Acknowledgements

This is a book about values of technologists, and it would not have been possible without the people surrounding me who have shaped and informed these values for technologists like myself.

I want to thank the incredible Gram Vaani team for nurturing a space that allowed us to learn, make mistakes, and emerge stronger with the bold vision of empowering marginalized groups through technology. In no particular order, this is all due to the inexhaustible energy of Vijay Sai Pratap for taking over the reins of Gram Vaani which gave me space to reflect on our work and to put this book together; Sayonee Chatterjee and Sultan Ahmed who have always reminded us of the ground realities to spot gaps that might exist in our work and to overcome them; Kapil Dadheech and Rachit Pandey for leading the development and maintenance of the technology infrastructure that powers our work; Rohit Singh for patiently identifying synergies of our work one-by-one with literally hundreds of partners; Paramita Panjal for being our team's internal moral force reminding us to first be empathetic with one another before we can build more empathy in the world; Rohan Katepallewar for continuously finding new applications of our work and spawning exciting novel directions; Dibyendu Talukder and Praveen Kumar for setting high standards for our technology capabilities along with team members Ankit Kumar, Sohan Madhana, Aman Verma, and Prince; Rohit Jain, Vinod Maurya, Sujeet Kumar Choubey, Vishnu S, and Shiv Prakash Maurya for making sure that our technology services keep chugging along; Deepak Kumar and Rajeshwari Tripathi for patiently working through one of our most complex projects in Bihar; Brejesh Dua, Prashant Choubey, Matiuur Rahman, Subodh Patra, and Ramjan Ali for maintaining the quality of our projects; Lamuel Enoch, Bruno Richardson, and Eswaramoorthy for independently managing our work in Tamil Nadu; Sangeeta Saini and Saraswati Kumari for being the strongest and longest standing pillars of our content team, committed towards upholding the quality of our work along with their team members Vasanti Kumari, Ritu Singh, Preety Kumari, Madhubala Pandey, Shweta Sharma, Suresh Kumar, Dinesh Rautela, Akash Anand, Mohona Dasgupta, Sunidhi Raj, Sonali Samal, Anjali Kumari, Shilpee Minz, Deepak Jaiswal, Anand Kumar, Anika Parween, Aman Gope, Akhilesh Kumar, Naweed Ali, Nasia Raunaque, Sumitra Kumari, Rohit Paswan, Rishikant Pandey, Aman Anurag, Rajeev Ranjan, and Juhi Mishra; Amrita Ojha, Ashok Sharma, Rafi Ahmad Siddiqi, Santosh Kumar, Amarjeet Kumar, Deepak Kumar, Zulfaquar Ali, Deoraj Pankaj, Mehtab Alam, and Sanjay Kumar for being our eyes and ears on the ground and our faces to

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The Gram Vaani team extends to its hundreds of volunteers on the ground who proved their mettle especially during the COVID-19 pandemic by supporting community members to get access to food, cash, medical attention, transportation, social entitlements, and basic human dignity. It is through our volunteers that Mobile Vaani has upheld its standards of equality, humility, good journalism, and service.

All of Gram Vaani's work of course would not have been possible without support from numerous donors, investors, and partners, and the trust they placed in us. The list is really too long for me to mention all the people who in small and big ways have contributed towards it, but I specifically want to mention a few names who have been instrumental in shaping our work and vision: Anuragini Nagar, Arti Jaiman, Arvind Singhal, Ashok Shukla, C.S. Sharma, Daphne Luong, Harlan Mandel, Helen Hua Wang, the Indian Angel Network, Jean Drèze, Jessica Mayberry, the Knight Foundation, Lisa Braden-Harder, Mamta Kohli, the Media Development Investment Fund, Mira Johri, Nivedita Narain, Poonam Muttreja, Rajendran Narayanan, Rajiv Khandelwal, Rakshita Swamy, Reetika Khera, Rupsa Malik, Sajan Veniyoor, Sasa Vucinic, Sashwati Banerjee, Soham Mazumdar, Suhel Bidani, and Syed Karim.

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Inspiration from role models is what keeps us going. Over the years, the ICTD community became my home and provided no shortage of motivation. In particular, I want to thank Bill Thies, Richard Anderson, Neil Patel, and Rikin Gandhi for their inspirational innovations and persistence; Lakshminarayanan Subramanian, Kentaro Toyama, Neha Kumar, and Melissa Ho for their commitment to holding the community together; Revi Sterling for pushing these values into

broader agendas; and so many other colleagues for making ICTs for development into a genuine force for good.

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I want to sincerely thank Tim Unwin for contributing a very kind and thoughtful Foreword, and to the Emerald Publishing team led by Kimberly Chadwick for all their attention to detail and taking the project forward.

My family deserves the most credit for supporting me in completing this book and for persevering in my work. Whenever I have felt defeated, I have not had to look further for inspiration than the strength of my mother Vasundhara Seth and the righteousness of my late grandfather Ramesh Chandra Seth. Whenever I have grappled with understanding new concepts, my late grandmother and teacher Vimla Seth has always shown the light. My wife Stuti Khanna has not only contributed directly by being the one to suggest that I write this book, even proposing its name, and for pointing me towards many valuable references, she has also kept me grounded and realistic all these years, and has patiently tolerated all my craziness. My daughter Iram Seth-Khanna is the most special person in my life – an activist to the core with a fierce sense of justice and always asking tough questions. This book is for her.

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Chapter 1

Introduction

Computer technologists may appear to rule the world today. Technology companies have among the highest market valuations. Students aspire to turn into entrepreneurs and build the next tech unicorn. No industry functions without information technology. Informatization of production processes has, across industries, disrupted the very nature of work through increased automation and improved precision. Even the shift of the public sphere of discourse to privately managed online communication platforms has made democratic processes subservient to the design and management policies of these platforms. Large technology companies are so powerful today that they are able to resist pressures by governments to bring them under control, and threaten to withdraw instead of complying with regulations (Clayton, 2021). Investors alike are giving way to the founders and managers of technology companies, and allow themselves to be steered in whichever direction the founders want as long as the investors get good returns (Acemoglu, 2020; Surowiecki, 2012).

Yet, there is an increasing alienation among technologists. White-collar workers in technology companies face the same types of alienation as blue-collar workers face in factories (Healy, 2020). They have little say in the specifications of the software they write, or the final output that is created from the atomized technological components which they build. Even workers involved in creative processes with building or managing cutting-edge technologies face an existential dilemma of having no control over how technologies produced by their labour end up getting used by people, or being put to undesirable uses by their companies. In fact, in the name of making economic processes more efficient or increasing the safety and security for society, technologies are increasingly being used as instruments of surveillance to control populations, curtail freedoms, and shape consumer behaviour. This disempowers the very people whom the technologies were meant to support. The conflict is clearly visible with employee protests at companies such as Facebook and Google (Issac, 2019; Shane & Wakabayashi, 2018; Thompson & Vogelstein, 2018), the formation of white-collar unions in the Silicon Valley (Conger, 2021), and a backlash against the so-called big tech in many quarters of both society and the state (Doward, 2018). There is so much skepticism about

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these technologies that many technologists who design and manage them advocate against their own families using them (Kulwin, 2018; Wong, 2017).

Even in scholarly academic spaces which are valued for the freedom and creativity they allow, there is increasing alienation arising from indirect control exercised by the dominant capitalist system over research direction (Healy, 2020). With pressures of getting research grants, demonstrating technology transfer to the industry, and metricized performance assessments in terms of publications and citations, many researchers are unable to change research directions or influence the ways in which their work gets used towards more meaningful goals for society. Rather than being able to solve social problems, researchers are realizing that optimizing the use of technology towards purely economic goals is clearly inadequate, but are able to do little about this disconnect.

Speaking from my own experience as an academic, and that of many colleagues, an alienation is arising even in teaching. Decisions by our students on what courses to credit, how much effort to put, and a long-term commitment towards projects, all seem to be driven by an economic rationality which results in alienating us from teaching as a means to equip students to solve social problems (Mehra, 2021). What could be a genuine form of exchange of knowledge and ideas between students and teachers becomes a mere transactional exchange of know-how and information that is devoid of any social connection between us and them.

Braverman documented long ago that white-collar work done sitting in offices may not be very different from blue-collar work done in sweatshops or on assembly lines (Braverman, 1974). Even the creativity allowed among elite technologists, or the high wages commanded by them which enables them to voluntarily choose what to do with their time, may not be sufficiently satisfying if they are unable to connect their work with the rest of society. Marx's concept of humanism explains this alienation successfully, with its axiomatic basis of humans as workers who produce for society, and derive their humanism through positive social relationships fostered by the production process and the produced output (K. Marx, 1844). These social connections created between workers when they cooperate with one another, and between the workers and those who find genuine *use-value*¹ in the produced goods and services, is what make them feel more human. Alienation arises if social or economic systems modulate these relationships and force them to take restricted form through domination or instrumental or exploitative use of others. Alienation is unsustainable since it makes us less human. Humanism implies the re-establishment of positive social relationships in their full form, through production that meets genuine use-values of society, through production processes that are not coercive, and that connect producers and consumers with one another in multi-dimensional social relationships of mutual understanding and cooperation instead of straightforward uni-dimensional economic

¹I refer to genuine use-value as arising from a commodity when it fulfils a societal need, its use or production does not harm anybody, and these processes are also unmediated by instrumental mechanisms such as advertising.

relationships. Anti-humanist systems that harm people by creating negative social relationships alienate humans from humans, and are unsustainable.

Technologists are no different. Higher wages, sanitized white-collar office-spaces, flexibility of work, and scope for creativity, may give momentary illusions of autonomy and freedom to technologists, but their fundamental human nature will surface sooner or later to question the inevitable alienation they would experience if they continue to distance themselves from society. This belief forms the basis of this book, meant to provide pointers to technologists to re-acquire a humanism for themselves that is getting lost, and further to build and deploy technologies that can increase humanism in society as well. I equate social good with such a humanism and outline some steps that technologists can take to do social good.

In Chapter 2, I describe the context of current social and economic systems. The hegemony of capitalism has entrenched an ideology of self-interest and individualization, which reduces humans to economic agents rather than beings that draw their humanity from creating social relationships that benefit others in society. In coalition with the state and the apparatuses of media and digital capitalism that shape thoughts and behaviour, even undeniably negative values of exploitation, lies, and deceit manage to remain hidden from plain sight. Likewise, authoritarian socialist regimes that draw their ideology from equality and cooperation among all members of society, are no different in viewing people as mere cogs in a machine, with the use of propaganda to conceal the underlying contradictions. Technology, built and managed by technologists, has thus been reduced to an instrument to sustain these anti-humanist social and economic systems. Technologists, too, are encouraged and trained towards building systems that produce efficient economic relationships or tools that bring order in societies through control, rather than work on technologies that can foster cultures of humanism. Technologies produced by them therefore only reinforce the dominant ideologies.

Yet technology is also very powerful. Digital communication platforms have bridged physical distances between people. Information platforms have made knowledge more easily accessible to people. Transactional platforms have facilitated meaningful social relationships between producers and consumers. However, when such technologies are entirely driven by an economic rationality rather than humanist principles then they can have disempowering effects. Digital communication platforms such as Facebook have not done enough to prevent their appropriation by hegemonic divisive powers which increase social distancing in society.

The forms of knowledge commonly communicated over most information platforms on the Internet have served to entrench dominant ideologies of economic rationality in society. Transactional platforms such as Uber have sided with supporting relationships that are exploitative of the producers since their own economic sustainability is contingent upon surplus value that emerges from this exploitation. Technology is clearly a double-edged sword.

Can technologists ensure that technology does not merely provide tools to sustain the entrenched structures of today, and rather restores humanism to society? I believe that technologists who build and manage these technologies, are in an increasingly powerful position to bring positive changes for two reasons. One, they can increasingly control how their technologies operate so that the social and

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economic relationships, and knowledge, intermediated by their technologies, create more cooperation and pluralism in society, and less exploitation and domination of the weak. Two, as they gain increasing importance in social and economic spheres, they can dictate what technologies are actually built in the first place, to shift technology production to forms and spaces that restore humanism.

Chapter 3 therefore raises the question of what is good for society – what should technologists aim for, to bring more humanism in the world, and through this process to also build a new utopia of work for themselves? To answer this, I suggest reducing the *social good as humanism* argument to an ethics-based foundation. This can help debate in a principled manner about which values define social good, how to handle competing values, adherence to the values in both the means through which a technology is designed and the ends to which it is deployed in society, and understand the (dis)empowerment effects of technology about who benefits or who is harmed by it. Ethics-based reasoning can thus equip technologists to answer questions about what technologies to build, and how to minimize harm that may arise from it. Chapters 4–6 build upon this in more detail.

Chapter 4 describes an ethics-based framework to diagnose whether a particular technology is internally consistent in the values that govern its goals, design elements, and management practices. I discuss several aspects of technology design and management where ethical questions frequently arise, such as persuasive user interfaces that nudge user behaviour towards predictable directions, algorithms that encode objectives and quantify categories in a formal manner that can be discriminatory and unfair, data-driven algorithms that may reproduce societal biases, and consequently shape social relationships intentionally or unintentionally in ways that may disempower the weak and reduce humanism. I discuss the ethical values that govern these design and management aspects, identify some values that should straightaway be rejected as anti-humanist, and whether the rest are internally consistent with one another in a given technology system.

Chapter 5 examines the interface between technology design and socio-technical management in more detail, based on the observation that even a robust ethics-based and value-centric design of technology may not be sufficient to prevent harms arising from it. The complexity of the world and unpredictable uses arising from the affordances and malleability of most technologies make it imperative that a tight feedback loop is maintained to track how a technology gets used in practice, and this feedback is then used to manage the technology more effectively by constraining its harmful uses. I discuss this through my own experience over the years with being closely involved in guiding the development of Gram Vaani's platforms for participatory media. New challenges arose, and still continue to arise, at the socio-technical interface when these platforms are used and appropriated by people seeking to meet their goals.

While Chapters 4 and 5 are more focussed on avoiding harm arising from technology, Chapter 6 goes back to the question of what technologies to build in the first place – are there any core values that the design and management processes of technologies should espouse to restore humanism and do social good? I draw a

relation between anti-humanism experienced in capitalist regimes as arising from an accumulation of power. Technologies of governance used by the state similarly rely on the monopoly of the state to use violence as a means of exercising power over people to control them. Social good as humanism will always be incongruent with relationships of domination or those that disempower the weak. It is therefore necessary to build technologies that transform social relationships to lead to the distribution of power towards power-based equality in society. Building upon the wide literature of power, I discuss commonly used techniques that lead to the accumulation of different types of power, and collective action as a means to counter such centralizations of power. I suggest that a rationality based on the economics of power can be more successful in discovering pathways of doing social good than trying to find solutions through economic markets or following directions laid down by authoritative socialist structures. Transforming the entrenched power structures in society is however a political project. Even if technologists move away from their general apolitical attitude to taking a conscious political stand, many challenges are likely to confront them in walking down this path. Chapters 7–9 explore this question.

Chapter 7 outlines the organizational, economic, political, and societal structures within which technologists operate, which constrain their ability to uphold values of humanism in their work. Functionally segregated workspaces built upon the principle of the division of labour prevent technologists from establishing a direct connection with users and various stakeholders who interact with their technologies. This growing social distance between technologists and the end-users contributes to a lack of understanding by technologists of the true impact of their technologies. Economic pressures to provide increasing returns on capital and to counter competition, prevent technologists from testing their work adequately to ensure safe and productive use of their technologies for society. Carefully crafted ideological narratives by both the state as well as the corporate sector about the transformative potential of technologies to benefit society makes it difficult for technologists to see through this simplistic view of technology optimism. They fall for this mistaken belief and labour towards producing seemingly useful technologies but which in fact may be harming society more than benefiting it. Regulatory capture or simply hiding undesirable-outcomes arising from technologies further prevents democratic governance and economic markets to control what technologies get built and how are they used. Societal segregation with growing inequality, in which white-collar technologists predominantly form a part of the elite, also contributes to a disappearance of social relationships between technologists and users.

Chapter 8 presents several mechanisms to counter the problems presented in the previous chapter. Communication platforms to connect technologists with the users of their technologies, collective action by technologists to gain a say in the management decisions of their corporations, cooperative forms of ownership where management control rests in the hands of the workers, exercising lawful control over intellectual property to prevent its use for oppression of the weak, and financing mechanisms that can enable new initiatives grounded in humanist values to successfully compete with the dominant hegemony of capitalism, are

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some emerging exciting developments underway in different parts of the world. None of this is easy, though. Not only are such counter actions difficult to initiate and sustain by technologists for the reasons listed in Chapter 7, bringing about a transformation of work for technologists requires the participation and support from society itself.

Chapter 9 discusses steps for such a transformation in partnership with wider society. Human societies have already developed sophisticated institutional mechanisms to govern themselves in accordance with the values in which they believe. If a society embraces new values, then these can make their way to markets when consumers begin to demand these values from the companies with which they transact. Markets have no inbuilt ethics of their own, but are agile enough to include new values in capitalism. Alternately, citizens in democratic states can demand the government to enforce these values through regulatory means and in turn make markets adhere to these values. Or societies could build new systems of governance and the economy to replace capitalism. The crux, therefore, may lie in building initiatives that can bring about a transformation in society in terms of the values it respects. Technologists may have a role to play here, in enabling participatory democratic discussions on values among society members, while respecting pluralism and diversity among the members. In this regard, I finally discuss the need for information and communication platforms that can promote such discussions for deliberative democracy, as well as help technologists remain better connected with the users and other stakeholders interacting with their technologies. I highlight gaps in the current systems of participatory media, and what characteristics information platforms should adopt to serve as a basis for bringing about an understanding among diverse social groups. These discussions can help define values that society democratically agrees to be good and useful for itself, which can further inform the ethics-based foundations of work done by technologists for social good. Technologists will then not be alone, their struggle to prevent their own alienation will join hands with a struggle by society itself to restore humanism and impose its social control over technology.

I have written this book from the perspective I have gained as a technologist myself. I see my own experiences as being reflected in the theories of people including Marx, Foucault, Gramsci, Habermas, and Amartya Sen, which have been connected with current society by people such as David Harvey, Cristian Fuchs, Partha Chatterjee, Andre Gorz, and Mike Cooley, and echoes with literature in ethics and technology that is closer to computer scientists, written by people like Norbert Wiener, Luciano Floridi, and Tim Unwin, drawing validation from the harms of technology brought to light by colleagues including Kentaro Toyama, and inspirational figures of activists like Jean Drèze, who remind us to remain grounded and be in touch with the people whom we hope to impact. Ideas from thinkers such as Jean Drèze, Amartya Sen, Thomas Piketty, and Arturo Escobar, on the dynamics of poverty and development, and humanitarians like Harsh Mander who relentlessly try to repair the fabric of society that ties humanity together, have also either influenced my actions over the years or find a strong resonance with my own experiences, and have shaped the thoughts in this book. With such a diverse scholarship, and given

my limited training in the social sciences itself, I have not attempted to adhere to the traditions of any one specific academic discipline. The book is therefore a mash-up of ideas, thoughts, principles, and validations, borrowed directly from eminent theorists such as the ones I have named above, or derived deductively in some cases, or in other cases obtained inductively through case-studies from my own work and immediate observations of other technologies. These have been useful to me to provide a basis for my own way as a technologist, and I feel are also increasingly relevant in today's world that is dominated by technologies yet has a long way to go in orienting its moral compass to positively impact society. Most of the examples I use in this book are drawn from India and my own work, while the theoretical concepts on which I base my analysis often originated in other parts of the world. My hope is that this mix of geographies will make the arguments more widely applicable, and especially draw attention to similarities and differences in technology related issues in the Global South and Global North.

As a teacher, I hope my students will find this useful and align themselves towards meaningful work for society. As an entrepreneur, I hope my colleagues from Gram Vaani will understand the tremendous value that emerges from their day to day work towards which they have dedicated themselves. I also hope that my academic friends and colleagues, those in the social sector, and investors and funding agencies who have worked with me, will be able to understand the true motivation behind the work by me, my students at IIT Delhi, and team members at Gram Vaani. Lastly, the book is meant for technologists – those I may not know, but for whom it is most important to recognize their unique place in today's society and the transformative potential they hold to truly make this world a better place through their work. Technologists working in the ICTs for development space may find discussions about my experiences with Gram Vaani to be helpful in understanding the complexities of realizing impact through technology. Those working in companies that do not specifically identify themselves with doing social good or working towards social development may benefit from the discussions on ethical evaluation of technologies and how technologies may empower or disempower people. Technologists who genuinely do want their work to benefit others may realize why they need to build a broader understanding about the day to day lives of their users and how technologies shape them, to then design and manage technologies in a responsible manner. I hope this book will help technologists to see through the exploitative structures dominant in today's world, understand why these structures persist, learn how to transform these entrenched structures by identifying and building technologies for social good, and engage politically to support and scale these technologies, to eventually displace the hegemonic paradigms of technology production that result in technologies which disempower people.

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