This is a forum for perspectives on designing for communities marginalized by economics, social status, infrastructure, or policies. It will discuss design methods, theoretical and conceptual contributions, and methodological engagements for underserved communities. **— Nithya Sambasivan, Editor**

The Remarkable Illusions of Technology for Social Good

Nithya Sambasivan, Google

Since information and communication technologies (ICTs) first became available to the public more than 20 years ago, social good has been an important application area for computing. Today, more than ever, there is widespread momentum in deploying technologies for social good across computing domains such as user-facing interfaces, networking and systems, and data sciences.

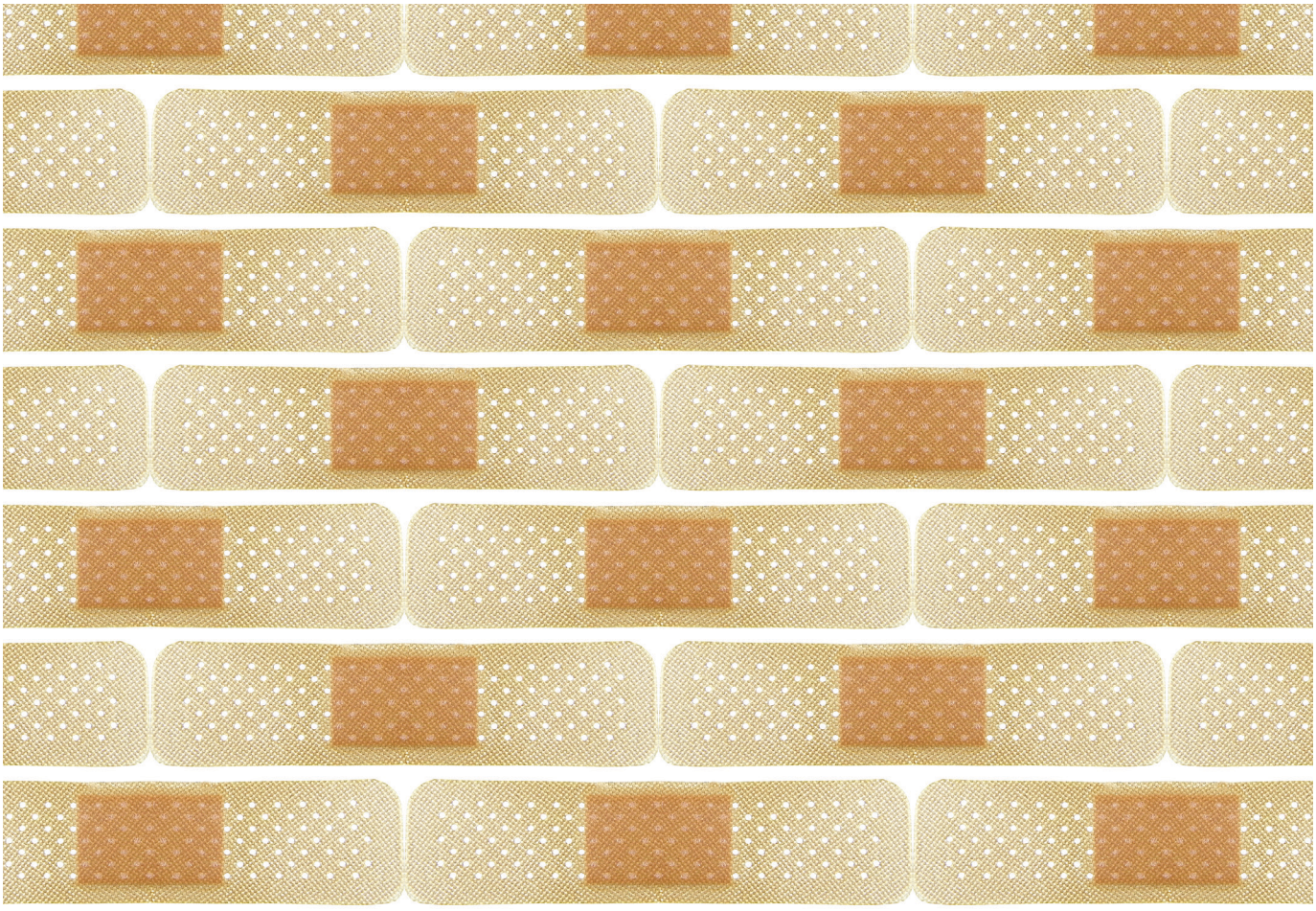
Among various computing stakeholders, there is a growing desire to seek humanistic and ethical impacts for technology, beyond consumer or enterprise benefit. Researchers and practitioners are finding new and innovative applications in social good, with its complex social and technical challenges. In response to citizen aspirations, governments are turning toward the digitization of entire countries and deploying welfare through technology. Universities are hiring faculty and establishing educational programs to specialize in social good, owing in part to the increased acceptance of such research in the community. Once revenue is established elsewhere, industry finds value in repurposing homegrown technologies toward social benefit or in corporate social responsibility and public relations programs.

We are facing a new phase of technological history where the possibilities, conditions, and scope for designing for social good are considerably different from those of the past. However, without careful thought and dialogue, technology can create surface-level effects that provide an initial semblance of success with deeper, less welcome subterranean effects on society. In this article, I outline how we can take a more generative and fruitful approach to designing technologies for social good by asking critical questions in design.

Technological fixes may not impact entrenched social realities. Technology has properties that are particularly well-suited for societal applications: efficiency, scalability, accountability, speed, and replicability. These properties motivate many developers to scale past consumer applications to topics of corruption, healthcare, crisis response, and other pressing issues. However, such challenges are not purely technological—they involve the complex interplay of historical, cultural, political, and economic effects over decades. To reduce or remove these deeply embedded realities through tools is, often, to cure select symptoms. Take, for example, the technology-mediated direct cash transfers for workers under the 2005 National Rural Employment Guarantee Act (MGNREGA) scheme in India, which guarantees 100 days of manual work to every household, for example, by building roads or joining other infrastructure projects. A study of MGNREGA deployments in various parts of India by Srinivasan et al. shows that in contrast to the promises of cash transfers being direct (i.e., no middlemen), instantaneous, and fully transparent, in reality, technology-enabled cash transfers involved substructures of middlemen, had an average delay of 43.6 days, and required bribes from highly marginalized villagers to contractors [1]. Corruption is a deep-seated abuse of power entrenched in forces of marginality such as caste, community, religion, income, and social standing. Furthermore, a contractor may demand a bribe from a low-income villager because they view their salaries as inadequate and there is a cultural acceptance of bribes, all the way from the leaders to the foot soldiers. The transparency aspects of technology alone cannot eliminate corruption when it has been widely normalized (even if it's coercive). While technology may be productive in producing specific gains, it is only a piece in the larger interconnected web of underlying structures, and improvements to specific metrics may reflect local maxima in a large-scope reality. As Kentaro Toyama points out, schools need good teachers and administrators to produce high-quality students, not simply computer-aided teachers [2]. In other words, the best

Insights

- To reduce or remove deeply embedded historical, cultural, political, and economic realities through tools is, often, to cure select symptoms.
- Band-aid projects can exacerbate existing inequities and further marginalize communities with already fragile access.
- Rather than a starting point of *how* technology can be used for social good, a more generative opening is *whether* technology is needed in the first place.



solution to some societal challenges may not even be technological.

Velocity and scale of technology can confound usage with impact. In the early 2000s, when computers were just being made available to societies of the Global South and connectivity was patchy and expensive, ICTD approaches involved several cobbled-up and jury-rigged solutions to provide basic infrastructure, such as DakNet (traveling Internet) and WiLDNet (WiFi-based long distance networks). Public access was largely available only via telecenters, and limited to certain pockets.

Cut to today: Over half the world is online. Mobile phones have become de facto devices to connect to the Internet in the Global South. Apps and services can now be launched simultaneously around the world. Billions of people can be reached by digital technology. In addition to organic consumer growth, government interventions have accelerated digital growth in many countries by signing large contracts to provide network infrastructure, deployments, and big-data processing, usually via private parties. Vast segments of society can be reached directly, without going through intermediaries like NGOs or institutions, enabling easy software pushes and quick feedback cycles.

Some Silicon Valley culture, such as "launch and iterate" cycles and usage-based metrics, has seeped into social good domains, leading to metrics like daily active users and monthly active users. Usage metrics equate usage with agency on the part of a consumer but do not adequately capture the actual impact on their lives. For example, research by Preeti Mudliar shows that WiFi hotspots in Rajasthan, India, were predominantly used by men because of their higher unrestricted physical mobility when compared with women [3]. While such hotspots may indicate high-bandwidth activities and high usage, and there may be a temptation to conclude success, a deeper look reveals that they may be marginalizing specific user groups.

The transparency aspects of technology alone cannot eliminate corruption when it has been widely normalized.

Technology now has far-reaching consequences that we don't fully understand. In contexts where economic resources are scarce, technology offers compelling reasons for deployment, such as cost reduction and efficiency. Often, large-scale digital initiatives are justified by rhetoric on how they are good for the masses, typically accompanied by justifications of morality or modernity. When implemented haphazardly without questioning the need or expected effects, such Band-aid projects can exacerbate existing inequities and further marginalize communities with already fragile access. Take AI, for example, and its increasing use in social good projects due to its ability to learn and predict

IMAGE BY SUPERDUMB / SHUTTERSTOCK.COM

from large volumes of data, finding applications in areas such as image classification, language understanding, decisions systems, and robotics. AI-based systems that work as expected for mainstream populations are prone to repeatedly mischaracterizing or overestimating the risks of minority communities, due to a variety of factors. AI-based obstetrics systems in perinatal and maternal care to predict risks and manage health outcomes run the risk of making things worse for black mothers, who have higher maternal mortality rates compared to white mothers [4]. Or how predictive risk-assessment tools like COMPAS estimated that black offenders were almost twice as likely as white offenders to be labeled a higher risk but not actually reoffend [5]. Another illustrative case is that of the Aadhar digital-identity system (based on biometric and demographic data), positioned to improve ration delivery, bank-account creation, midday meals, and even death-certificate handling. However, as research by Reetika Khera and others shows, Aadhar's implementation issues with seeding, connectivity, fingerprint scanning, and security led to certain segments, such as low-income, older, and disabled communities, being excluded from receiving services [6].

At scale, when technology misses an entire population or context, it can lead to unintended consequences. Technology is not a value-neutral medium. It has emergent properties that can interact with social, cultural, and economic norms and cause new effects.

A path forward. Technology for social good projects have remarkable charm, and, in a very human way, help us feel more connected and find more meaning in our work. It is truly commendable that our community aims to create and sustain projects with aspirations to solve some of the world's toughest problems. However, the HCI community can take a principled stance to ask the tough questions early on in technology-for-social-good projects, instead of dealing with consequences on a post-hoc basis. Rather than a starting point of *how* technology can be used for social good, a more generative opening is *whether* technology is needed in the first place.

We need to work even more with allied communities of ethicists, historians, science and technology studies (STS) scholars, development scholars, and others to expand our lenses and blind spots in designing for social good. We can start by asking some of the following questions in our projects:

- Which problems need to be tackled the most?
- Is technology relevant here?
- Who decides?
- How does the technology challenge the underlying norms and structures?
- Whose interests are served? Who gets left behind? How do we know?
- What are anticipated long-term effects and stabilizations?
- What should we do if there are unanticipated negative effects?
- How should we measure the impacts?

It takes humility and even detachment from pet ideas to ask some of these questions, but they might lead to more reflection and critique—which is always powerful.

Endnotes

1. Srinivasan, V., Narayanan, R., Chintala, S. C., Chakraborty, D., Veeraraghavan, R., and Vardhan, V. Is there such a thing as a "direct" cash transfer?. *CDDRL Working Papers*. 2014.
2. Toyama, K. There are no technology shortcuts to good education. *Educational Technology Debate 8* (Jan. 2011).
3. Mudliar, P. Public WiFi is for men and mobile internet is for women: Interrogating politics of space and gender around WiFi hotspots. *Proc. of the ACM on Human-Computer Interaction 2* (CSCW), 2018, article 126.
4. Banjo, O. Bias in maternal AI could hurt expectant black mothers. Motherboard. Aug. 17, 2018.
5. Angwin, J., Larson, J., Mattu, S., and Kirchner, L. Machine bias. ProPublica. May 23, 2016.
6. Khera, R. The different ways in which Aadhaar infringes on privacy. The Wire. Jul. 19, 2017.

Nithya Sambasivan is a researcher at Google AI. She leads research on building human-centered AI in the Global South. She has a Ph.D. from UC Irvine. Her research has won top awards at HCI and ICTD conferences.
→ nithyasamba@google.com

DOI: 10.1145/3319378