

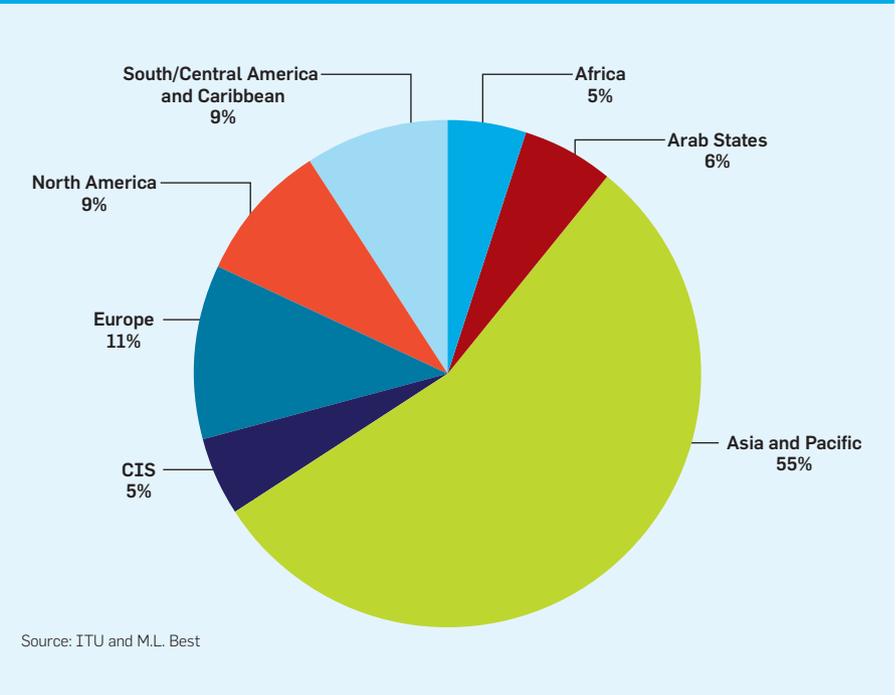
## Global Computing Thinking Outside the Continent

*Encouraging the opportunities for digital innovation and invention to flourish in a variety of social environments.*

**I**N A RECENT STUDY I conducted with the International Telecommunications Union (ITU)<sup>3</sup> we operationalized the concept of the Digital Native and proceeded to count them across the planet. Criticisms of the Digital Native premise notwithstanding (and there are many) we argued that young Digital Natives are driving the adoption and inventing the future of information and communication technologies (ICTs) in many unlikely places across the globe. In Europe or North America almost everyone is online; and this is even truer for the young there. Meanwhile, the percentage of the population digitally networked in Africa and South Asia is low, however the proportion of youth adopters is relatively high: in some parts of Africa there are two or three online youth for every online adult.

Small levels of digital penetration are one explanation why large computing multinationals and research universities routinely ignore Africa and parts of Latin America and Asia. But a look specifically at these regions' Digital Natives reveals a collection of innovators and users spearheading some of the world's most exciting ICT advances. These Digital Natives are leading through rule-breaking lateral thinking but they also simply lead in their sheer size. The number of global Digital Natives disaggregated by region shows Europe and North America as but small slivers of the worldwide pie (see Figure 1). A paradox looms: computing researchers

Figure 1. Global distribution of Digital Natives.



and practitioners design for the Global North, but the sheer numbers and opportunities for innovation are overflowing in the Global South.<sup>a</sup>

<sup>a</sup> Terminologies describing Africa, Latin America, and much of Asia have varied with the times. The “Third World” emerged from the Cold War, which is now as obsolete as the Soviet Union. “Developing world,” though commonly used, seems pejorative and patronizing. The term “Global South” describes a collection of countries located mostly in the southern hemisphere, while “Global North” refers to what some have called the “developed world.”

### A Case of Nigerian Digital Native Innovation: The Social Media Tracking Centers

Nigeria is Africa's most populous country, a nation of enormous possibility and seemingly endless challenges. The deeply contested political environment has played out in a series of fraught elections. During the lead-up to national elections in 2011 the country seemed to hang on tenterhooks. Nigerian Digital Native activists, calling themselves the “Facebook generation,” invented ways to use social media and mobile

# ACM Transactions on Accessible Computing



This quarterly publication is a quarterly journal that publishes refereed articles addressing issues of computing as it impacts the lives of people with disabilities. The journal will be of particular interest to SIGACCESS members and delegates to its affiliated conference (i.e., ASSETS), as well as other international accessibility conferences.

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**Figure 2.** Social media tracking center in Abuja, Nigeria, in 2011. The monitor depicts histogram visualizations of trending reports created by Aggie software.

apps to help ensure a free and fair election. The Social Media Tracking Center (SMTC) and the Aggie social media aggregator software were results of this.<sup>b</sup>

The Aggie system, developed primarily at Georgia Tech, combs social media sources from Twitter, Facebook, Google+, Ushahidi, and other social media platforms. The data is streamed in real time to Aggie, which presents trends grouped around voting logistics, violence, political parties, and so forth. The SMTC team, based in Nigeria's capital city of Abuja, watched these trends (see Figure 2), detecting possible election irregularities or occasions of violence that warranted further attention. Reports categorized the incidents, which were relayed to the election commission, police, and other relevant stakeholders.

Approximately 750,000 reports were analyzed through the SMTC system during the three-week election period. Social media activity peaked during the April 16, 2011 Presidential election. When violence erupted in the North of the country, Aggie received nearly 50 reports a second. The system has been replicated for elections in Liberia, Ghana, and Kenya, with results that are only now being analyzed robustly<sup>5</sup> though initial results show great promise.

## Computing Innovation and the Global South

Computing practitioners and researchers often design for the Global North

<sup>b</sup> Many groups collaborated on this including Enough is Enough, the Shehu Musa Yar'Adua Foundation, the MacArthur Foundation, and other donors, as well as partners such as Georgia Tech and Harvard University.

but much of the action is in the Global South. The preceding case study demonstrates the energy of African Digital Natives driving opportunity and invention in the Global South. Young people in these contexts will continue to surface opportunity for exploration and invention, in areas such as:

► **Networks and infrastructure.** The Global South is seeing exponential growth in networks and infrastructure (while the rest of the world moves with-in replacement and upgrade cycles). Broadband penetration is on the rise. But ubiquitous cloud-computing capable access is still a goal not entirely met; the network reality for most people feels like it is partially cloudy with occasional thunderstorms.<sup>4</sup> All sorts of design challenges and research opportunities, from intermittent connectivity to community clouds, demand our attention.

► **HCI.** Usability and interface design are not common fields of work in the Global South, but this is not for want of opportunity. Africa is the world's most linguistically rich continent, but many Africans lack print literacy in their native language. Non-print interfaces (voice or visual) might provide rich innovation spaces. We continue to deploy *personal* computers into places where the technology is mostly shared and not kept by a single person.<sup>1</sup> Do we need a *community* computer instead? What does the desktop metaphor mean in a context that does not value or use desks? Why do we rely on the QWERTY keyboard for languages that do not include the 'Q', 'W', or 'E'?

► **Channels.** A lot of discussion has focused on the prominent rise of mobile phone use in low-income coun-

tries and thus whether mobile phones are the technological “winners.”<sup>6</sup> The global rise of mobile phone networks, now usually with data support, is clear; and the desirability of mobility itself is also clear. Similarly, low-cost laptop initiatives have captured considerable attention—sometimes suggesting these particular systems will solve all the problems of development. In reality, neither mobile phones nor laptops are the perfect appliances for all situations. We need to better understand what the best design and form factors are for end-user appliances regardless of the network or distribution model. Do we need to design an entirely new appliance, something with a more appropriate display or input device or better suited to end-user sharing for instance?

► **Software engineering.** Is there a software engineering approach unique to the Global South? It is an odd question, but one that keeps surfacing as I collaborate in Africa or Asia. In any engineering practice the cultural contexts matter, as does the training and engineering capacities. So why should not there be software engineering practices unique to and particularly designed for the African (or for that matter the Nigerian) context? This approach might hybridize some of the flexibility of agile methods (in particular to help focus on testing and to combat feature bloat) with some of the more conventional structured methods (which resonate with some culture’s top-down traditions).

► **Sustainability.** When issues of sustainability arise in computing initiatives in the Global South they tend to focus on financial self-sustainability tethered to market forces and neo-liberal economic theory. However, there are other forms of sustainability that demand our attention: environmental, technological, social and cultural, political and institutional. Work in computer science can touch on all of these forms of sustainability. For instance, technical sustainability will be enhanced by easy-to-use systems or systems that allow for remote maintenance. Similarly, low-power-consuming devices enhance environmental sustainability.

Computing researchers and practitioners want to think outside of the box. That is easy: think outside of the

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continent! This column will push thinking beyond traditional borders to where the population, and the opportunities to innovate, both flourish.

At the recent ITU Global Youth Summit, representatives of the world’s Digital Natives called for more access and more invention. “The spread of information amongst young people can directly foster empowerment and innovation on a global scale,” they wrote. “Health, civic engagement, online protection, environmental protection and economic success all depend on having unfettered access to knowledge which ICTs can extend to everyone.”<sup>2</sup> By following the lead of these Digital Natives, especially those coming from the Global South, we just might help them invent, and protect, our global future. **□**

### References

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# Calendar of Events

**June 16–19**

The 11<sup>th</sup> Annual International Conference on Mobile Systems, Applications, and Services, Bretton Woods, NH, Sponsored: SIGMOBILE, Contact: David Kotz, Email: kotz@cs.dartmouth.edu

**June 16–20**

ACM SIGMETRICS/ International Conference on Measurement and Modeling of Computer Systems, Austin, TX, Sponsored: SIGMETRICS, Contact: Sanjay Shakkottai, Email: shakkott@austin.utexas.edu

**June 21–25**

Innovation and Technology in Computer Science Education, Uppsala, Sweden, Sponsored: SIGCSE, Contact: Asa Cajander, Email: asa.cajander@it.uu.se

**June 22–27**

International Conference on Management of Data, Salt Lake City, UT, Sponsored: SIGMOD, Contact: Curtis Dyreson, Email: curtis.dyreson@usu.edu

**June 23–26**

ACM Web Science Conference, Bloomington, IN, Sponsored: SIGWEB, Contact: Filippo Menczer, Email: fil@indiana.edu

**June 25–27**

ACM International Conference on Interactive Experiences for TV and Online Video, Newcastle Upon Tyne, U.K., Sponsored: SIGCHI, Contact: Patrick Olivier, Email: p.l.olivier@ncl.ac.uk

**June 25–27**

19<sup>th</sup> ACM Symposium on Access Control Models and Technologies, London, ON, Canada, Sponsored: SIGSAC, Contact: Sylvia L. Obsorn, Email: sylvia@csd.uwo.ca

**June 30–July 2**

International Conference on Systems and Storage, Haifa, Israel, Sponsored: SIGOPS, Contact: Eliezer Dekel, Email: dekel@il.ibm.com