

## **How Open Source Software and Wireless Networks are Transforming Two Cultures: An Investigation in Urban North America and Rural Africa**

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### **Book Chapter Overview for Mapping Emerging Digital Spaces in Contemporary Society: Properties of Technology, Karim G. Martin and Phillip Kalantzis-Cope (Eds.), Palgrave Macmillan, USA**

Many people in developed countries take access to information and communication technologies for granted. Such individuals live and work in a well-connected information society with access to digital resources that is almost universal. However, a global analysis of the contemporary information society paints a much more complex picture (Chinn & Fairlie, 2007; Fuchs, 2009; Yates, Gulati & Weiss, 2010).

For businesses and the more fortunate, digital inclusion enables access to resources that provide information, communication, education, commerce and entertainment. For the less fortunate and more isolated members of contemporary society, access to such resources can help overcome the many barriers to participation in the global information society. In the early stages of development, however, new technologies may reinforce or even widen existing economic, political and social inequalities between the haves and have-nots (NTIA, 2000; United Nations, 2001; van Dijk, 2006). Much of the previous research supports the view that technological advances mostly have created new or exacerbated existing inequalities between the information rich and poor, both within nations and between nations (Guillén & Suárez, 2005; Fuchs & Horak, 2008; Mossberger, Tolbert & Gilbert, 2006).

This article (Yates, McGonagle & Tawileh, 2008) explores how open source software and wireless networks enable digital inclusion in the United States and Africa. We begin by measuring the digital divide in these very different regions of the world. Our research demonstrates, both quantitatively and qualitatively, how the digital divide places populations in both regions at a disadvantage. Next we examine the role of these technologies in bridging the digital divide along three complementary dimensions. First, we show that both affordable technology and sound policy are necessary for digital inclusion. Second, we look at how these two technologies are extended, integrated, and customized in information and communication technology (ICT) solutions that are both creative and effective. Third, we describe how the hardware and software in networked systems have been tailored to support applications that are as diverse as the people using them.

Because the digital divide is wider in most regions in Africa than it is in the U.S., bridging the digital divide in Africa often requires more comprehensive ICT implementations. We survey wireless networking and open source software that enable ICT solutions and analyze their critical role in bridging the digital divide. We present more detailed investigations into a few important technologies, specifically IEEE 802.11 wireless networks, wireless mesh networks, and GNU/Linux-based open source software. We see the immediate and widespread impact that these technologies have in communities as different as Castle Square in Boston, Massachusetts and Karagwe, Tanzania. We also see how these technologies are being used to educate children

today, so that they will acquire the knowledge and develop the ingenuity needed to design global ICT and ICT for development (ICT4D) in the future.

## References

- Chinn, M. D., & Fairlie, R. W. (2007). The determinants of the global digital divide: A cross-country analysis of computer and Internet penetration. *Oxford Economic Papers*, 59(1), 16-44.
- Fuchs, C. (2009). The role of income inequality in a multivariate cross-national analysis of the digital divide. *Social Science Computer Review*, 27(1), 41-58.
- Fuchs, C., & Horak, E. (2008). Africa and the digital divide. *Telematics and Informatics*, 25(2), 99-116.
- Guillén, M. F., & Suárez, S. L. (2005). Explaining the global digital divide: Economic, political and sociological drivers of cross-national Internet use. *Social Forces*, 84(2), 681-708.
- Mossberger, K., Tolbert, C. J., & Gilbert, M. (2006). Race, place, and information technology. *Urban Affairs Review*, 41(5), 583-620.
- NTIA (2000). *Falling through the net: Toward digital inclusion*. Washington, DC: National Telecommunications and Information Administration, U.S. Department of Commerce.
- United Nations (2001). *Human development report 2001: Making new technologies work for human development*. New York: Oxford University Press.
- van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34 (4-5), 221-235.
- Yates, D. J., Gulati, G. J., & Weiss, J. W. (2010). Towards universal broadband: Understanding the impact of policy initiatives on broadband diffusion and affordability. In *Proceedings of European Conference on Information Systems (ECIS)*, Pretoria, South Africa.
- Yates, D. J., McGonagle, T., & Tawileh, A. (2008). How open source software and wireless networks are transforming two cultures: An investigation in urban North America and rural Africa. *International Journal of Technology, Knowledge and Society*, 4(6), 145-157.