



## Interdisciplinary Perspectives on the 'Digital Divide'

### Part I: Economic Perspectives

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Information and communication technologies (ICTs) have been rapidly diffusing around the world in the past thirty years. However, many observers in international government and non-government organizations, including the various agencies of the United Nations, the World Bank, the Organization of Economic Cooperation and Development, and the International Telecommunications, among other organizations, have recognized through their research studies that the global distribution of ICT capital has not been even. They also have argued that technology has not been uniformly effective in boosting countries' economic growth, social welfare, and technological well-being. In two special issues (December 2005 and January 2006), the *Journal of the Association for Information Systems* explores the issues of the *digital divide*. This term is most often used to characterize the differences in access between social systems at different levels of aggregation, such as regions of the world, countries, individuals and organizations to the advanced capabilities of computers and the Internet, telecommunications and wireless phone services, and the wealth of knowledge that can be found in sites and pages on the World Wide Web.

Our editorial goal of the guest co-editors, Sanjeev Dewan of the University of California at Irvine and Fred Riggins of the University of Minnesota, and I for these two special issues is to create the basis in *JAIS* for ongoing interdisciplinary exploration and discussion of the leading digital divide issues and perspectives. These include public policy, public use, and social welfare; ICT investments, corporate strategy, social impacts and economic value; accelerators and inhibitors of ICT adoption and diffusion, and national and regional ICT penetration; political, social, and structural readiness for e-commerce; and different human aspects of usage, behavior, and effective design. This seems like an especially apropos time to bring this discussion to print, in view of the recent news of Nicholas Negroponte's and the MIT Media Labs' efforts to distribute millions of "\$100 PCs" in the global marketplace, to transform the economics of computer and Internet access, and to begin to bridge the gap between the "digital haves" and the "digital have-nots."

The present issue—the first of two issues—focuses largely on economic perspectives related to the digital divide. But the lead article, by Sanjeev Dewan and Fred Riggins, “The Digital Divide: Current and Future Research Directions,” is intended to set up the interdisciplinary emphasis of both issues. They cover perspectives from sociology, economics, the diffusion of innovations, public policy, and technical design. The authors explore the issues at three levels of analysis: the global, organizational, and individual levels. They also encourage us to consider the *first-order effects of the digital divide*, which reflect unequal levels of ICT access, as well as the *second-order effects of the digital divide*. The latter occur when there are equal levels of access to ICT, but unequal capabilities to make effective or value-producing use of them. They conceptualize the ICT adoption cycle in terms of technological innovations, access, and use, and suggest a variety of theoretical perspectives that they believe will be relevant to the future study of the key issues in this knowledge space. They also remind us of the importance of the full set of research tools that will be necessary to make progress in solving the problems associated with the digital divide, including measurement approaches, case studies, cross-sectional and longitudinal surveys, econometric analysis, and analytical modeling approaches from economics and management science. In my view, the authors have produced the definitive survey piece: it provides a conceptual interdisciplinary umbrella for world-class research in the digital divide arena, and a roadmap of twelve research recommendations that set the agenda for future research in this area.

After the survey article, the remaining three articles of the December 2005 special issue cover economic issues in the digital divide. The second article, “Is There a Global Digital Divide for Digital Wireless Phone Technologies?” is authored by Rob Kauffman of the University of Minnesota and Angsana Techatassanasoontorn of Pennsylvania State University. Their work contributes to knowledge on the digital divide, specifically related to cross-national links that promote regional diffusion of digital wireless phone technologies. They also contribute to the more general purpose of *J AIS*, by developing and presenting a new *regional contagion theory of technology diffusion*. They apply their theoretical perspective to wireless phone diffusion in 43 developed and developing countries, and find that a more well-developed telecommunications infrastructure, more competition in the wireless market, lower wireless network access costs, and fewer wireless technology standards are associated with more rapid diffusion. They obtain their results through an innovative blend of macroeconomics-related econometrics—including near vector autoregression and variance decomposition analysis, as well as supporting mini-cases.

The third article is by Chris Forman of Carnegie Mellon University, Avi Goldfarb of the University of Toronto, and Shane Greenstein of Northwestern University, entitled “How Do Industry Features Influence the Role of Location on Internet Adoption.” They offer a new perspective on the *corporate digital divide* by building and testing two contrasting theories that help to explain industry location choices and the geography of Internet adoption. Specifically, they propose urban leadership theory and global village theory, and seek to identify the characteristics of a given industry that encourage its firms. Their *urban leadership hypothesis* predicts that the rate of corporate Internet adoption within an industry will be higher when the bulk of the firms are located in urban areas. In contrast, their *global village theory* suggests just the opposite: when a larger fraction of an industry’s firms are located in urban areas, the industry’s adoption rate will be slower. The authors’ results point to the importance of industry type—especially IT-producing industries vs. IT-using industries—and why the extent of an industry’s geographical

concentration and differences in its labor costs lead to differential outcomes in Internet adoption in urban and non-urban areas.

The final article explores socio-economic explanations of the digital divide in the global country-level context. The work is entitled "Across the Digital Divide: A Cross-Country Multi-Technology Analysis of the Determinants of IT Penetration," written by Sanjeev Dewan, Dale Ganley, and Ken Kraemer of the University of California at Irvine. The authors explore the extent to which a digital divide has existed across three overlapping ICT generations in mainframe computing, PC and the Internet during the past twenty years. The authors use panel data and econometric analysis methods—notably quantile regression—applied to data on ICT penetration in 40 countries from 1985 to 2001 to identify key moderators of technology growth and diffusion. They find that the relative strength of the impact of several factors varies, depending on the stage of ICT penetration in a country and the underlying technology generation that is being studied. More specifically, they find that ICT penetration grows in the presence of higher gross domestic product (GDP) per capita, which turns out to be the most significant driver of all in their models. But higher GDP also appears to have a greater effect on additional penetration when ICT penetration is already high—a moderating effect. The authors report on other key variables too, including technology costs, urban population, education level, and the influence of the trade sector in an economy. A final key perspective that emerges in this research is that socio-economic factors have exhibited differential effects on the growth of the successive technology generations in developed and developing countries. But the penetration of the most recent generation of Internet technologies among the developing countries now seems to be occurring in association with somewhat lower levels of the advantageous factors that seemed instrumental in promoting the growth of the earlier generations of ICTs.

The January 2006 issue of *J AIS* will include the second installment of the digital divide special issue papers, which will be packaged as "Part II: Sociology Perspective." We look forward to its publication, and showcasing the authors' new research.

A few closing words are in order to share some background on the genesis and development of this project, and what it took to get it done. This project was conceived in discussions that involved Sirkka Jarvenpaa, the founding editor of this journal, and me, in my role as a senior editor of *J AIS*. I offered to identify important areas of research in economics and information systems that might be of interest. At the time, my faculty colleague, Fred Riggins at Minnesota, was involved in research that examined pricing and channel management issues, and the resulting "corporate digital divide." The ideas he was pursuing seemed very broad in terms of the audience to whom they could speak. As I talked with Fred about his own work, I planted the early seed of an idea that would eventually germinate to become an interdisciplinary research symposium. Sanjeev Dewan at the University of California at Irvine, a leading scholar who is known for his empirical research on IT value in the international context, later joined our discussion. Fred and Sanjeev eventually took the lead—and did all the "heavy lifting"—by organizing a joint research symposium between the Management Information Systems Research Center (MISRC) and the Digital Technology Center of the University of Minnesota, and the Center for Research on Information Technologies and Organizations (CRITO) at the University of California, Irvine. They brought together nearly 40 well-known information systems, marketing, economics, management science, sociology, communications, and policy researchers from leading schools of business, information science and technology, public affairs, and arts and sciences, as well as

public policy research organizations. The *J AIS* special issues were a natural outcome of their collaboration.

Hearty congratulations go to Sanjeev and Fred in their roles as guest co-editors, and for contributing to the knowledge base of an important new area for IS research. Sanjeev and Fred did a wonderful job emphasizing the range of interdisciplinary perspectives and public policy interest associated with the digital divide. They deserve credit for bringing together people from many different disciplines and creating the basis for extraordinary intellectual exchange. I also acknowledge the participants and presenters in the 2004 Joint MISRC/CRITO Digital Divide Research Symposium, as well as the reviewers who worked to bring out the best qualities in the Symposium papers and the articles that appear in these two *J AIS* special issues. I also would like to thank Donna Sarppo, Assistant Director of the MIS Research Center, for her perfect arrangements, logistics, and follow-up on the various aspects of the research symposium. Without her help, this whole project would not have gotten very far.

I want to offer thanks to Angsana Techatassanasoontorn of the School of Information Science and Technology at Pennsylvania State University. Angsana offered many suggestions to me as I worked with Fred and Sanjeev to put "the polish" on the final versions of the articles that you will read in the special issues. Finally, Yusun Jung in the *J AIS* Office at Case Western Reserve University also did an outstanding job to guide Fred, Sanjeev, and me on the completion of this project. Thanks for all you are doing for *J AIS*, Yusun—and for helping us.



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