INFORMATION INFRASTRUCTURE IS A PUBLIC GOOD (AND MUCH MORE IN THE DIGITAL AGE)

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Extending the Information Society to All:
Enabling Environments, Investment and Innovation
Panel 4: Is Information Infrastructure a Public Good?
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INTRODUCTION

I am honored to have been invited to speak to this InfoDev forum and particularly pleased to have been asked to provide a somewhat different point of view, especially in light of some of the comments from first day of the forum. I believe that there were claims made that simply miss the fundamental point of information infrastructure.

For example, we were told that competition will solve the problem. We were given the example of Sri Lanka, where competition worked wonders because there were seven facilities based competitors in the market, although the failure of another 20 due to difficulties in getting licenses was lamented. I live twelve miles from the White House in Washington, D.C., and I don't have seven facilities based broadband providers available. Obviously, if you have seven facilities based competitors, you do not have an infrastructure problem.

Then we were told that voice over Internet protocol (VOIP) will solve the problem. We were given the example of Skype, which was represented to use as the third largest telephone company in the world with 60 million subscribers. However, every one of those subscribers already has a broadband connection, which means the infrastructure exists. We cannot learn much about deploying infrastructure from that example either.

Finally, the project evaluators told us that they could not find much economic benefit from some of these projects, although they believed in their hearts that there was such benefit. Part of the problem is that they define the benefits too narrowly. Only business functions count; social and personal functions of the network do not. But we know that the social uses of communications vastly outweigh the businesses uses. In fact, this points to a more fundamental problem with bean counting. There are many positive externalities from these projects that are difficult to count. I am convinced that if micro-economists had been the midwives at the birth of

capitalism, we would all still be serfs living on feudal manors and little infrastructure would exist.

ECONOMIC FRAMEWORK

INFRASTRUCTURE	PUBLIC GOODS
Basic Problems	
Economies of scale/ Long horizon	Non-Rivalrous
Supports wide range of activity	Non-Excludable/ Externalities
Solutions	
Natural monopoly/duopoly	Social Obligations
Positive externalities	Public support for investment/ Allows internalization

The questions and comments from the audience suggested to me that there was a good deal of resistance to this narrow framing of the issue. So my original purpose has been sharpened. I will offer an economic explanation of why the bean counters can't really "get it" and the private sector won't build the information infrastructure that developing nations really need. What I will do is put en economic theory around the gut instincts of the audience and back it up with evidence from the history of economic development, particularly in the U.S.

INFRASTRUCTURE AND PUBLIC GOODS: THEORY

Infrastructure is typically defined as a large investment that affects many aspects of the economy and exhibits substantial economies of scale.[1] Costs decline as more people use the infrastructure and the value of the economic activity it supports expands. Given the size of the investment and the need to expand consumption over a long time horizon, it is difficult for private actors to realize an adequate return on such projects. It is highly unlikely that multiple suppliers will enter the field, so the probable outcome is a natural monopoly, at best a duopoly and at worst a "no-opoly."

Public goods are defined as goods that are non-rivalrous and non-excludable.[2] By non-rivalrous, economists mean that consumption or use by one person does not preclude consumption or use by another person. Non-excludable means it is difficult to prevent people from using the good without paying for it. As a result, there is a tendency for people to free ride

and for private actors to under invest. In other words, the private market under-supplies the public good, even though it is good for the public.

As an empirical matter there are several clear linkages between infrastructure and public goods from the development economics point of view, especially when information infrastructure is the project.

- First, infrastructure generates positive externalities by stimulating economic activity and public goods solve the problem of the inability to internalize externalities in private, market transactions.
- Second, as a practical matter, when infrastructure projects are first deployed and for a large part of their economic life, they tend to be uncongested and therefore non-rivalrous.[3] This is particularly true in low density areas and at low levels of income.
- Third, traditionally, we only worry about public goods when they are infrastructure (except for national defense). These are important projects that society really needs but they are not likely to be provided by private parties in adequate quantity or on terms of access that sustain the level of activity that is desirable.
- Fourth, infrastructure industries have generally been networks, connecting people and places. They have always exhibited network effects, where the value of the network grows as more people are connected to it. Information infrastructures in the digital age exhibit very strong network effects and all the positive externalities that result.
- Finally, information has long been recognized to possess these characteristics – to be non-excludable, non-rivalrous and the fount of massive externalities.

Infrastructure in the Development of Capitalist

For historical evidence on the importance of information, we can start with Thomas Jefferson, who said it well almost two centuries ago.

> If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of every one, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less, because every other possesses the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been particularly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation. Inventions then cannot in nature, be a subject of property.[4]

For historical evidence on infrastructure, we should not be surprised to find that, since the very birth of capitalism and, I believe at the heart of its success, highways of commerce and communications have been treated as infrastructural, public goods because they are "affected with the public interest," to use the legal term of art.[5] Physical and social mobility were anathema to feudalism, but essential to economic progress. Providing for open and adequate highways of commerce and means of communications were critical to allow commerce to flow, to support a more complex division of labor and to weave small distant places into a national and later global economy.

HISTORIC EVIDENCE

Ubiquitous communications infrastructure available on an open basis are part of the DNA of capitalism

Subsidies to ensure availability and affordability

Layering of alternative means of communications to promote efficiency

Public goods do not have to be public enterprises or directly supported by public funds

Competition does not eliminate need for social obligations, or justify abandoning them

I like to say that nondiscriminatory access to the means of communications and commerce are part of the DNA of capitalism.[6] From the turnpikes of the early 17th century, to the canals of the early 19th century, to the steamships, telegraph and railroads of the late 19th century, to the telephone networks and airports of the 20th century, communications and transportation networks were subsidized either directly with public funds or indirectly with franchises, powers of condemnation, and sole source contracts. In exchange, they were asked to shoulder the burden of common carriage – the obligation to provide services to all on nondiscriminatory rates, terms and conditions.

Note that this is very much a capitalist model; but one that is progressive and socially responsible. Public interest obligations and regulatory oversight are imposed to prevent abuse, while franchises and other subsidies ensure universal service and smooth out the boom and bust cycle that could undermine infrastructure projects or limit the supply of services they provide. Let us be clear here that public goods do not have to be provided by public enterprises, nor do they have to be directly supported with public funds. There are other ways to lower the risk and impose social obligations. A mix of private incentives and public obligations was, perhaps, uniquely American. Balance is the key to ensuring that the creative power of capitalism is channeled in the most socially responsible directions.

The Contemporary Debate in Advanced Nations

In a handful of very advanced nations, with fully built-out networks and large middle classes that have an avaricious appetite for bandwidth, a debate has broken out as to whether this centuries old model can be abandoned. In this handful of societies, where incomes can sustain large bundles of voice, video and data, the incorrectly framed question is whether to swap regulation of what may be an unnatural monopoly for a crummy, deregulated duopoly.

I say the question is incorrectly framed because a little bit of competition has never been an excuse to eliminate obligations of nondiscriminatory access. The presence of market power on the supply side is only one of several considerations in determining whether social obligations and requirements for nondiscrimination in access should be applied to a particular service, and by no means the most important.

> Public roads competed against privately owned canals, but they were both subject to common carrier obligations. Private railroads were added to compete with canals and roads, and they were all subject to common carrier obligations. Telegraph, wireline telephone and wireless are all common carriers. In other words, throughout its history, alternative modes of communications were layered one atop another, each using a different technology, each optimized for a somewhat different form of communications, and still we imposed the common carrier obligations to ensure access.[7]

Nevertheless, in the U.S. Senate, legislation has been introduced that would turn all broadband networks into private carriers, with no public interest obligations whatsoever. Universal service would no longer be a goal of public policy. The network owners could discriminate as it suited their commercial interests. Federal and state governments would not be allowed to regulate any aspect of these networks and municipalities would be precluded from building broadband networks. The draft bill in the House of Representatives is quite different. While it does create a new space for broadband networks, it worries more about discrimination, requires interconnection of networks, and preserves the right of local governments to build these networks.

Interestingly, while the U. S. debates this proposition, most of the other advanced industrial nations have not been drawn into this debate. Asian countries, in particular, continue to recognize that deploying advanced communications networks needs aggressive public policy.

The Importance of Information Infrastructure in Developing Nations at the Dawn of the Digital Age

More importantly, for the rest of the world, this debate is a non-starter. The problem is not congestion of existing networks or refinements of the so-called triple play – voice, video, and data – with $2,000 media center personal computers to extract maximum consumer surplus. The challenge is to get these networks deployed so that they can start generating the externalities of economic development that are needed so badly. The possibility of sustaining multiple networks, which is even in doubt in the most advanced nations, is virtually nil on the rest of the planet. A

single network is what is needed and requires support; centuries of history have taught us that infrastructure projects deserve it. The challenge in four-fifths of the world is to start generating surplus by extending infrastructure to larger parts of these societies and positioning them to move up the ladder in the global division of labor.

UNIQUE ROLE OF INFORMATION INFRASTRUCTURE AT THE DAWN OF THE DIGITAL ERA

Accelerates autonomous local growth

Local production and export of information goods

Expanding gains from trade

Reshaping global division of labor and position within it

In fact, I believe it is more important than ever to deploy information infrastructure as rapidly as possible as public goods, driven by social goals not short term profits, because the digital revolution presents a unique opportunity for the vast majority of the world's population. In the digital age, technology, not nature, has made information "like fire, expansible over all space… and like air… incapable of confinement or exclusive appropriation."[8]

- First, the opportunity for advances in productivity opened up by information and communications technologies means local economies can accelerate autonomous economic growth (i.e. economic growth based on local resources) because knowledge is embedded in technology more than in the past.
- Second, digital technologies create the possibility for a dramatic change in the production of information goods, drastically lowering the costs of production and distribution, while transforming consumers into producers. Decentralizing production improves the fit between what consumers want and what they get and open the door to the export of information goods (both functional goods, like software, and cultural goods, like entertainment and artistic products).
- Third, potential gains from trade have expanded because communication and information exchange across space and time are much cheaper and more efficient than ever before, which permits the coordination of widely distributed potential sources of creative effort and the aggregation of actual distributed effort into usable end products.
- Fourth, at times of technological revolution, the shape and nature of the global division of labor is up for grabs, as are positions within it.

The intense debates over intellectual property rights and Internet governance that are taking place elsewhere at this summit and elsewhere in the global community are one indication

that the stakes are huge. My point in raising them here is this. No matter what the ultimate terms of trade are, if you do not have the information, communications and technology infrastructure in place, you will not be able to take advantage of the opportunity. If you wait for the private sector to provide these public goods, you may well be left behind. Thus, in my mind there is no question that information infrastructure is a public good. The only real question is how to get it deployed over the globe as quickly as possible for it will surely contribute to the "the moral and mutual instruction of man and the betterment of his condition."[9]

(Endnotes)

[1] Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions* (Cambridge: MIT Press, 1988), p. 11.

[2] David Besanko and Ronald R. Braeutigam, *Microeconomics: An Integrated Approach* (New York: John Wiley & Sons, 2002), p. 727.

[3] Brett Frischmann, "An Economic Theory of Infrastructure and Commons Management," *Minnesota Law Review*, April 2005.

[4] James Boyle, "The Second Enclosure Movement and the Construction of the Public Domain," Conference on the Public Domain, Duke University School of Law, November 9-11, 2001, citing Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), in Albert Ellery Bergh, (Ed.), *The Writings of Thomas Jefferson* (1907), pp. 326, 333-34.

[5] Mark Cooper, "Making the Network Connection," in M. Cooper (Ed.), *Open Architecture as Communications Policy* (Stanford: Center for Internet and Society, 2004).

[6] Mark Cooper, "Too Much Deregulation or Not Enough?," *Natural Gas and Electricity*, June 2005.

[7] Cooper, "Making the Network Connection."

[8] See above, note 4

[9] Id.