Universal Access: Precedents, prevarications and progress

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Today universal access is a key issue in a wide range of public policy discourses including those involving education, the disabled, minorities, community networks, e-government, e-democracy, public sector information, and digital libraries. It has also inspired many grassroots efforts such as NetDays, in which volunteers came together to install wires and equipment in schools to enable connectivity to the Internet, and the Wi-Fi networks that seek to provide free Internet access to the entire community. The universal access concept is widely and also loosely used. This widespread use combined with the fuzziness of the universal access concept has resulted in a discursive field that lacks coherence.

In spite of the apparent ambiguity surrounding the universal service concept, it has proved to be a perennial favorite of policy-makers, scholars and laypersons alike. If there is any theme unifying the vast and scattered universal access literature, it is the repeated calls for extending the concept to new technologies and services (Dordick, 1991; Gillan, 1986; Hadden1991a, 1991b; Information Infrastructure Task Force, 1993; National Telecommunications and Information Administration [NTIA], 1988, 1991; O'Connor, 1991; Office of Technology Assessment [OTA], 1990; Pacific Bell, 1988; Parker, Dillman, & Roscoe, 1989; Williams, 1991; Williams & Hadden, 1991). These calls to extend universal service to new technologies and services seem to strike a responsive chord every time. This suggests that in spite of all its ambiguities (and perhaps because of them), universal service taps into some key concepts, values or ideals that we hold in common

The aim of this paper is to describe the processes by which the universal service concept is extended to new technologies and services as they emerge. We identify the key concepts and ideas underlying the universal service debates, trace out their origins in different domains of social experience and describe the processes by which these concepts are appropriated from their domain of origin and transformed and reapplied to new socio-technical systems as they emerge.

An outline of the conceptual model can be presented in bare outline as follows, with the evidence saved for subsequent sections. We start by studying the roots of the

concept in four original precedent setting systems—universal postal service, universal education, universal telephone service, and broadcasting. The postal service, the first universal system, is especially important because it was a subject of much discussion in the Continental Congress and is specifically mentioned in the Constitution. Universal education, on the other hand, in spite of much celebration of the ideal it represents, was in reality a product of a long and contested incremental process. Universal telephone service and broadcasting, the more recent systems, provide the more immediate conceptual foils for newer systems. The former has been the source of much of the vocabulary in the universal access discourse and the later of the PICON (public interest, convenience or necessity) concept.

Our historical experiences with these precedent setting "proto-systems" reveal a set of core principles about what universal service represents or should represent. These core principles emanate from the culture and values of a society rather than the particulars of any specific technology. They animate the drive for universal access and also inform the design of the policies and programs instituted to attain that ideal.

As new systems emerge, the case for universal access to the new services does not always go down to the level of the core principles—these remain internalized and largely implicit in the minds of policy-makers. Instead the precedent-setting proto-systems come to serve as the point of reference, by reifying the core principles and serving as models for the development of universal access in subsequent systems. The processes by which universal service was achieved in the proto-systems are reconfigured into an "imagined history" that confers coherence and purposiveness to historical developments that were chaotic and conditional. Though not necessarily false, it is this imagined history that is invoked in calls to extend universal service in subsequent systems.

When new socio-technical systems emerge, the case for universal service in them is soon advanced on the basis of the core principles and/or the imagined history of the proto-systems. One of the best ways of making a case for universal access to a new technology is by showing that is in keeping with the established precedents. However, a new technology rarely fits snugly into the established framework. Therefore the proponents of a new technology have to "stretch" established concepts from the precedent setting systems to fit the new situation. This stretching can be incremental

through a logical extension of the established precedent or quite allusive via an analogy. Beyond stretching, "back to the basics" is the other option for making a case for universal access to a new technology. Here the proponents of universal access in a new technology go past the imagined and actual history of the proto-systems to the core principles to formulate their argument.

To substantiate this conceptual mode, we first analyze the development of the postal system, universal education, universal telephone, and broadcasting and identify the "core principles" of universal service that emerged out of our historical experiences with these systems. Thereafter, we review the universal access literatures in the following domains: minorities, people with disabilities, digital libraries, and rural broadband to understand how the universal service concept came to be applied to these domains. We will demonstrate instances of both "stretching" and "back-to-basics" in the appeals to universal service made in these domains. We will conclude by identifying certain broad generalizations about the processes that extend universal service to new socio-technical systems.

Precedent Setting Proto-Systems

There is perhaps an element of judgment in our identification of precedent setting proto-systems. But the consideration set is so small that any divergence in opinion is likely to be limited to the addition or subtraction of a single system. We identify the precedent setting proto-systems to be universal postal service, universal education, universal telephone service, and broadcasting.

Universal Postal Service: While the US Constitution gave Congress the right to "to establish the Post Offices and Post Roads," preoccupation with other pressing matters prevented the Congress from legislating on postal issues. It was the Post Office Act of 1792 that set the stage for the future development of the postal system (Kielbowicz 1984). In fact the debates that took place and the compromises that were forged then set the contours of all the subsequent debates about universal provision of other technologies and services.

From the very beginning, the development of newspapers was intertwined with that of the postal system (John 1995; McChesney, 2004; Kielbowicz 1984). In order to

encourage the flow of information, there was widespread consensus that the postal rates for newspapers should be set as low as possible via subsidies from the regular mail. The real issue of contention was whether a flat rate should be used or should the rates be graduated by distance. Big city newspapers and those who wanted to maximize flow of information tended to favor a flat rate, while the advocates of distance sensitive rates sought to protect small town and rural papers. The final legislation was based on a compromise. It created two zones for determining postage for newspaper delivery. The rate for delivery within 100 miles was set at 1 cent and for greater distances 1.5 cents. Later, a third zone was added—newspapers within a state would be charged 1 cent even for distances greater than 100 miles.

More fundamentally, the 1792 Act represented a fundamental shift in mindset. Since the fifteen-century, European monarchs had been using the post as a source of revenue (Noam 1992). For the first time, the 1792 Act sought to plough back earnings into the expansion of the postal system. Also, the pre-1792 Act logic that each route should be self-supporting no longer held sway. Internal cross-subsidies from the high-density routes on the Atlantic and in the Midwest to sparsely populated areas in the Northwest and the south were the result (John 1995). This high level of cross-subsidy motivated the rise of private carriers who could undercut the post office rates. In spite of repeated calls for banning private carriers, the Congress, unlike the European governments, refused to ban them outright. But in the North and the East, areas generating surpluses that made subsidies possible, the post office, with congressional support, cracked down on private carriers, mainly via court orders.

The expansion of the postal system was a product of a potent combination of politics and idealism. The idealism was very real at the time of the birth of the new republic. For example, the routine publication of congressional proceedings to create a well-informed citizenry was unheard of in earlier times. In the same vein many proponents of the postal expansion saw it as something essential for a democratic polity. Ironically, some of the proponents had a paternalistic attitude in the sense that they sought to educate the masses. Others, on the other hand, saw an informed citizenry as an essential check on the government. Finally, there were those, including George Washington, who saw the flow of information essential for binding the nation together.

Universal Education: Today the United States has a well-established system of education across the continental expanse of the country. While there are notable variations in 14,000 school districts in the 50 states, the overall pattern is fairly consistent. It would seem that this system was a product of a grand design. But nothing would be further from the truth.

One could say that the idea of universal education has always been around at least since the American Revolution. George Washington, in his first message to Congress, stressed the importance of education. Many plans for a "system" of education were put forward including those by Thomas Jefferson, Benjamin Rush and Noah Webster. The American Philosophical Society even organized a contest for plans for an education system (Cremin 1980, Madsen 1974). Thus there was no dearth of ideas. But no concerted effort was launched to make universal education a reality. There was a failure to "translate sentiments into appropriations" (Ditzion 1947, p. 10).

However, as before the revolution, the education institutions continued to evolve incrementally. A great variety of institution types popped up across the country. For the ordinary citizens there were dame schools, parochial schools, old field schools, and district schools, which prepared children to become tradesmen or clerks. In the cities, there were venture schools and private schools that imparted practical skills like accounting and bookkeeping. Finally, there were the preparatory schools and Latin grammar schools, which prepared future scholars, doctors, clergymen, and lawyers for college (Sawhney & Jayakar 1999). These schools were supported by "nearly every money-raising scheme known to man" including lotteries, fines for public drunkenness, rate bills (tuition), license fees, and sale of war booty (Madsen 1974, p. 88).

The concerted effort towards a "system" of education finally began in 1830s. As Katz (1968) points out, "the extension and reform of education in the mid 19th century were not a potpourri of democracy, relationalism and humanitarianism" (cited in Button & Provenzo, 1989, p. 94). The people agreed to pay taxes for a public school system because of other reasons. The 19th century Americans voted for universal education mainly because they wanted to neutralize the growing immigrant threat, most of them being Catholics. A tax-supported public school was seen as the "principle digestive organ of the body politic" that would Americanize the newcomers (Strong, 1963, p. 89). The

propertied elites were apprehensive of the consequences of universal suffrage, which had become a reality during the Jacksonian era. Scared of the “mob rule,” they thought that "education could play an important role in reconciling freedom and order," that is, teach the masses to conform to the existing system and not destabilize it (Kaestle, 1983, p. 5). Finally, industrialists who wanted trained manpower for their expanding factories.

The convergence of above-mentioned forces got the government actively engaged in the universal education project and the citizens amenable to pay the taxes necessary to bring it about. The changed circumstances allowed people like Horace Mann, the idealistic champion of education who served as Secretary of the Massachusetts Board of Education, to build a coalition of religious, business, and other groups in support of universal education (Binder 1974). Earlier the government basically provided support for education via grants of land, special tax provisions, and other such assistance. Now, the government got into the business of building a *system* of education (Madsen 1974, p. 86). Implicit in the idea of a system was the principle of promoting uniform state-wide quality of education by combining and redistributing resources, where “the poorer school might be as good as the best; and the dearest almost as low as the cheapest” (Mann 1938, p. 48). In today’s parlance Mann was talking about what is referred to as rate averaging and bypass in telecommunications and postal arenas.

This move towards systemization was resisted by those who felt that the state should not intrude in a domain that has traditionally been under the control of parents, church, and local authorities (Madsen 1974). The different religious and ethnic groups, keen on preserving their cultures, were wary of the homogenizing impact of an organized system of education, which interestingly was the seen as a nationalistic goal of universal education even at the time of independence. The principle of the state’s authority over education, which is even today an issue with many Americans, had to become a settled question in law for a system of universal education to develop (Power 1991).

The system of universal education was not created by a single legislative act or executive fiat. It instead developed via a process of incremental local innovations in particular locales and then their diffusion to other school districts and states (Sawhney & Jayakar, 1999). Yet, interestingly, while there is considerable variation in institutional arrangements from one jurisdiction to another, there is a certain coherence at the level of

ideas which can be characterized as "public provision by small fiscally independent districts, public funding, secular control, gender neutrality, open access and a forgiving system, and an academic curriculum" (Goldin & Katz 2003, p.1). Thus we see that a few core ideas took different shapes in different locales creating diversity of form and while maintaining a coherence of principles, a hallmark of the American experience.

Universal Telephone Service[1]: The Bell telephone company introduced the telephone in the U.S. as a monopoly provider as it had exclusive rights over the early telephone patents. When the Bell patents expired in 1894, a number of competing telephone companies (the independents) entered the market. Bell refused to interconnect with the new entrants, with the result that the entire subscriber universe in the U.S. was fragmented into several non-interconnected networks (Brock, 1981; Friedlander, 1995; Department of Commerce, 1975). Vail's call for 'one system, one policy, universal service' was a reaction to this chaotic situation and aimed at integrating the fragmented subscriber universe. His vision did not include making telephone service accessible to all consumers as evident by the fact that he disdained to serve rural areas (Fischer, 1992; Friedlander, 1995; Gabel, 1969).

In order to secure full access to the subscriber universe, the Bell System wanted the government to permit it to acquire competing telephone companies in contravention of anti-trust laws. Not only that, the Bell System wanted the government to take an activist approach—a conscious, publicly mediated policy decision to 'unify the service' "that is, to eliminate the user fragmentation created by dual service" (Mueller, 1997b, p. 9). In other words, this vision of universal service could be secured only with the full complicity of the government. The government's response to Bell's acquisition campaign oscillated between opposition and acceptance. Initially non-committal, the government soon became opposed to acquisitions and got Bell to make the Kingsbury Commitment of 1913 whereby it agreed to stop acquiring directly competing independent telephone companies (Barnett & Carroll, 1993). Significant market share thus remained with the independents until 1921, when the Willis-Graham Act again permitted the Bell System to acquire non-affiliated companies. Eventually, the percentage of subscribers belonging to

[1] The materials in this section have been extracted from Sawhney & Jayakar (2004).

systems not interconnecting with the Bell System fell to less than 1% by 1926 and the U.S. telephone system was converted into a de facto monopoly (Department of Commerce, 1975).

Though there was no explicit commitment to universal service in the 1934 Communications Act, the accounting system put in place by the policy initiatives and court judgments of that era indirectly helped universal service. Even in the 1920s, there had been growing debate about how to allocate the costs of the local exchange. Protracted negotiations and court cases ensued involving the FCC and the Bell system that supported the board-to-board principle that would allocate the common costs to the local exchange, and the state regulators who put forward the station-to-station principle which allocated parts of the local exchange costs to long distance. Finally, in 1947, the National Association of Regulatory Utility Commissioners (NARUC) and the FCC jointly produced the Separations Manual that allocated a part of the common cost of the local loop to long-distance service (Mueller, 1997b).Even after the publication of the Separations Manual, there was no widespread recognition of the separations process as a way of keeping local rates low, and thus promoting universal service. Indeed, the percentage of local loop costs recovered from long-distance service as late as 1965 was less than 3% (Mueller, 1997b). But beginning in 1965, regulators began to gradually increase the cross-subsidies from long-distance to local service, aided no doubt by the substantial cost savings then being realized through the introduction of new technologies in interstate transmission.

Thus the elaborate system of cross-subsidies and rate averaging that is now recognized as ‘classical’ universal service began to emerge. But it neither spring forth from deliberate regulatory design, nor at a specific point in time. Instead, it evolved over a substantial period through a heavily contested political-legal-regulatory process in which the Bell System, state level regulators, the FCC, advocacy groups, and the courts played prominent roles. It is important to note that the relatively small number of influential interest groups involved and the broader revenue base (and consequent financial flexibility) of the monopolist made adjustments and accommodations possible, allowing for the incremental movement towards universal service. The need to justify a monopoly provided the impetus and the possibility of internal cross-subsidies within an

integrated system provided the means for universal service.

Interestingly, in many ways, the vision for universal service was reified after the 'objective' was accomplished. The Bell System became acutely mindful of the universal service mission when competition and antitrust lawsuits threatened to unravel its monopoly. Now, universal service became a useful defense for the preservation of the status quo. Aided by Bell sympathizers and even some consumer advocates worried about the implications of competition for affordable access, universal service came to acquire a long historic pedigree stretching right back to Vail's original declaration, far beyond its actual existence.

Broadcasting: When the Congress started working on the legislation for broadcasting in mid-1920s, it was faced with a fundamental choice. It could choose a system of a few high-powered stations that covered the country in large stretches or a large number of lower-power stations that covered the country in small patches. The high-powered stations would be able to generate both the resources and the economies of scale necessary to produce high-quality programming, but they would not provide an outlet for local voices, especially in rural areas and small towns. Conversely, lower-power stations would allow for diversity of viewpoints but would not have that many resources. The Congress left licensing decisions to the Federal Radio Commission (FRC) but it did direct the commission to allocate licenses and frequencies "among the different States and communities as to give fair, efficient, and equitable radio service to each of the same" (quoted in Kielbowicz, 2002, p. 12).

Unhappy with the FRC's decisions favoring large companies with high-powered stations, in 1928 Congress passed the Davis amendment, which compelled the commission to reallocate licenses equitably among the five zones and that resulted in more licenses for the West and South. However, the Congress repealed the zone system in 1936 because it found that sparsely populated areas could not sustain the number of stations they were being assigned. But even the new legislation continued to call for a "fair, efficient, and equitable distribution of radio service" among communities, albeit "insofar as there is demand" (quoted in Kielbowicz, 2002, p. 12). This doctrine came to be known as localism (Kielbowicz, 2002). Localism is defined as "the extent to which the

locality bounds, delimits, or sets apart residents' lives, including their work, personal relations, political involvement and identity" (Fischer, 1992, p. 194).

The other big question the commission faced was with regard to the ownership of spectrum. The 1927 Radio Act and the 1934 Communications Act deemed that the broadcast spectrum was a resource in the public domain that broadcasters could use, but not own. However, there were no guidelines or precedents for establishing how the spectrum should be allocated to the users. One of the tasks of the new Federal Radio Commission (and later the Federal Communication Commission) after it was created was to define the standards of conduct for a broadcast licensee. The commission developed the notion of trusteeship. Trusteeship regards the spectrum as a public resource that is entrusted to the licensee to be used for the public good. Taken together, the two concepts formed the "localism and trusteeship" framework (Messere, 2003). Basically, the framework states that the licensee shall act as a trustee of a public resource, the spectrum, who is obligated to serve all programming interests in the local audience and to provide coverage of all local public issues. Interestingly Messere (2003) argues that the FRC/FCC made localism one of its policy objectives out of a political motive—to extend its authority over local stations granted the Communications Act to network-affiliate relationship and national radio networks, by asserting an interest in the station's relationship to its local community. Thus the localism and trusteeship framework was not a neutral decision-making protocol, but part of an active policy vocabulary that could be used by key participants to extend their authority or secure their objectives.

The localism and trusteeship framework in turn was based on language in the 1927 Radio Act that mandated the FRC to make spectrum allocations on the basis of which "prospective broadcaster best served the 'public interest, convenience or necessity'" (p.18) (McChesney, 1993). Interestingly, the phrase "public interest, convenience and necessity," which has its origins in transportation and public utility law, itself provides an insight into the processes by which policy concepts move from one domain to another. According to Krasnow and Goodman (1998), the framers of the 1927 Radio Act were at an impasse about how to describe the obligations of the licensees under the Radio Act, that would sound concrete enough to stand for something definite in the public mind while being flexible enough to encompass all possible uses to which the

technology may be put in the future. A young lawyer on loan from the Interstate Commerce Commission suggested to Senator Clarence Dill that "public interest, convenience and necessity" (PICON) might be the standard and it stuck (Krasnow & Goodman, 1998) even though broadcasting is so different from transportation systems and public utilities. The vagueness or malleability of the concept allowed for this transfer from older systems to the new one and also gave the regulators considerable latitude to develop regulations for the evolving technology.

Core Principles

Each precedent setting system is different in terms of the technological artifacts and human resources it deploys and the type of service it provides. Yet they are kindred systems as their development was animated by the same ideas and values—our notions of democracy and equity. Furthermore, they all required redistribution of large amounts of monies in service of these ideas. Any situation that calls for some people to pay more so that others can pay less generates its own peculiar politics even when the exercise is towards widely embraced ideals. It is the reconciliation of the ideals, which cannot be avoided in a proud democracy, and the ground realities of taxes and subsidies, influence and power, and other such prosaic considerations that determine the architecture of these systems. Below, we identify the core principles that emerged from this reconciliation.

Information flow and exchange are socially and economically beneficial, and greater "informatization" is an indicator of progress. Information flow is seen as something inherently good. Washington saw it as a way of binding the nation together. Madison thought it was essential to check the power of the government. Others thought it would facilitate commerce. Furthermore, the nexus between democracy and information is taken as a given. Each successive effort to universalize a new service was driven by the desire to increase information flows in the country, something that was expected to strengthen democracy and increase general welfare.

Universal access cannot be provided without an organized systemic framework. Universal access is most feasible when it is incorporated within the overall design of a system, and when purposive programs are put in place for its achievement. Even for services that start in a bottom up manner, education for example, at some point they need

to be systemized to facilitate universal access. The systemic framework allows transfer of resources from one user group to subsidize another. These cross-subsidies were critical for the development of the universal postal service (subsidies from regular mail to newspapers and from the North and East to South and West), universal education (subsidies via property taxes from the rich to the poor), and universal telephone service (subsidies from businesses to residential users and urban to rural users). While broadcasting did not require an explicit system of cross-subsidy, cost of programming is recovered via advertising charges largely from urban audiences.

The organized systemic framework should not let the metropole dominate the hinterland. A universalized information and communication system by its very nature is an integrative force. Yet the metropole should not dominate the hinterland. There is a peculiar paradox here that policymakers have repeatedly grappled with. It was manifest in the flat rate versus distance based postal rate and high-power versus lower-power broadcasting debate.

Government subsidies or regulatory actions should not favor one commercial provider over another. Government should make sure that it "maintains a level playing field." Its interventions via subsidies or regulatory actions should not give an unfair advantage to any firm in the marketplace. We saw this principle in play in Congress' decision to allow all newspapers into the mail instead of selecting a few. It is also a recurring issue in the regulation of the telephone industry.

There should be uniformity in access across regions and social strata. Equity is equated with uniformity in provision of service. Uniformity not only resonates with our notion of information egalitarianism but also provides a convenient, controversy-free benchmark. Disparity in the quality of service between the rich and the poor and the urban and the rural areas has been a concern with every service.

Diverse Literatures

In the context of the core principles and the imagined histories of the proto-systems given above, we can now examine diverse universal access literatures—minorities, people with disabilities, e-government, digital libraries, E-Rate program, rural broadband, and community networks—for examples of the processes by which the case

for universal access is constructed. In each of these 'cases' will be looking for instances of "stretching" and "back-to-basics" as discussed in the conceptual model.

While there was an element of judgment involved in the selection of literatures for review, we believe we have covered all the major bases. We of course have not covered every bit of writing on universal access. For example, our review of disabilities literature touches on issues related to the elderly but does not specifically cover that particular literature. Similarly, we cover education related issues to a considerable extent in our review of the literature on the E-Rate program but then this particular program does not represent the complete picture. The same would be the case of rural broadband with respect to the overall rural telecommunications literature. Our review is by and large limited to the US oriented literature except for cases were developments in other countries set important precedents. In spite of these limitations, we believe we have covered vast territory that more or less tells the complete universal access story. We move through the reviews in the order listed above.

Minorities: One of the enduring problems in the universal service and digital divide debates has been minority access to information and communication technologies. While a number of studies have found evidence for this gap in contemporary data (Hoffman, Novak, & Schlosser, 2001; Lenhart et al., 2003; NTIA, 1995, 1999, 2000; Riordan, 2002), others have suggested that this gap has persisted in some technologies over long periods of time—telephones, computers and now the internet—while narrowing and disappearing in others, for example radio and television (Schement & Forbes, 2000). However in spite of the persistent and significant gap in some technologies, the issue of minority access did not attract much attention historically: early studies that include race as a predictor of access were done for the telephone (Gilbert, 1987; Perl, 1983); and classroom computer access (McPhail, 1985). Later studies also addresssed home computer and internet access (Lenhart et al., 2003; NTIA, 1995, 2000); and classroom internet access (DOE, 2000; NCES, 2002).

In general, scholars have relied on factors other than race to explain the difference in penetration between majority and minority communities. According to these studies, much of the difference in access is due to differences in household income, education, and professional status rather than race (Garbacz & Thompson Jr., 1997, 2003; Taylor,

1994). Other studies have included the impact of race as a factor in determining telecommunications demand (Hoffman et al., 2001; Lenhart et al., 2003; Riordan, 2002; Schement, 1995; Schement & Forbes, 2000; Taylor, 2002). In these studies, race and ethnicity emerge as factors explaining both the decision to subscribe to telecommunication service as well as the level of usage, to a high enough degree to lead some to label the internet the "world white web" (see chap. 4, pp. 95-120) (Bolt & Crawford, 2000). However, not all minority communities are confronted with a digital divide—Asian-American and some Hispanic American communities lead even the majority in access to computers and the internet (Walsh, Gazala, & Ham, 2001). "(A) digital divide exists, but not all minorities show up on the wrong side of it" (p. 279)

Though the evidence that an ethnic digital divide exists is substantial especially the African-Americans, explanations for the phenomena are less forthcoming. Some scholars question whether the digital divide for minorities is the result of active discrimination or different consumer preferences (Riordan, 2002). The systemic denial of service in inner city neighborhoods by telecommunications companies, a practice called "redlining" has been mentioned (Kahl, 1997). The service providers argue first that no redlining is practiced, but even if occurs in rare instances, it is a purely business decision due to insufficient demand that exists in these locations. Pockets of urban poverty themselves are a consequence of the housing policies followed during the segregation era, that excluded minorities from owning homes in the 'white' areas of time. Other studies have found little evidence of redlining based on income or on black or Hispanic concentration, but some confirmation of the practice in Native American and Asian communities (Prieger, 2001). Other factors identified having significant negative impacts on access were inner city or rural location, while market size, education, and Spanish language use increased access probability.

Other scholars have cited demand-side factors like cultural preferences and consumption choices to explain the differences in access. A distrust of science and technology may be one of the factors that prevent minorities, especially African-Americans, from subscribing to information and communication technologies engendered by the many instances where "scientific" studies were as tools of oppression—an example being the nineteenth century use of cranial measurements to

"prove" black inferiority (Mack, 2001). In another study, the researchers found that African-American university students tended to believe that "the internet and WWW were tools used by the U.S. government to track and monitor individuals" (p. 404) (Ervin & Gilmore, 1999)—this mistrust of government, and technology, kept them from going online even when access to computers, internet and the world wide web was not an issue. Other factors that has been commonly cited, especially for internet access, are poor consumption choices, bad credit and unscrupulous marketing practices by telecommunications firms (Mueller & Schement, 1996). the difficulty of mastering the technology (Kuttan & Peters, 2003; Lenhart et al., 2003); the lack of language- and culture-specific content (Kuttan & Peters, 2003); and worries about privacy (Ervin & Gilmore, 1999). Given these multiple reasons, no theme emerges in the literature as the single most factor leading to the ethnic digital divide.

The consensus in the literature seems to be that minority access to ICT is a vexing and significant problem, but one that is not amenable to easy solutions. While a number of federal and state programs exist to address the digital divide (for example, Lifeline and Linkup, the E-Rate, the High Cost Areas program, etc.), none are exclusively directed at minority communities though minorities end up being the major beneficiaries because of the household income and poverty provisions built into these programs. Scholars have also advocated schemes that fund community-level ICT programs, such as a public/private partnership program called "network neighborhoods" funded by the Housing and Urban Development (HUD) (Mack, 2001). Since one of the major reason minorities do not venture online is the absence of culturally and linguistically appropriate content, Mack also recommends content creation as significant step to bridging the digital divide.

However, not all scholars are in agreement that policy action is required at all—some argue that gaps in access are a natural part of technology diffusion, and sometimes disappear without any form of governmental action. For example, several surveys have shown that the gap in internet access that existed between men and women has now practically disappeared, with women in some studies showing up with a small majority in the internet population commensurate with their numbers in the overall U.S. population (see especially, chap. 4, Social Inequalities) (Norris, 2001). Schement and Forbes (2000)

point to the case of the radio and television, where no policy promoting household ownership was ever implemented in spite of the obvious advantages of citizen access to news and information. They argue that though the status quo may be unsupportable, so would any generalized policy prescription that does not recognize the complex interplay of factors that leads to the digital divide. Another observer takes a more radical position, that policy action is not required just because a gap exists "The issue is not one of information or knowledge gaps, any more than it is one of a protein gap or a transportation gap. If there is an issue, it is: What priorities should a society have in making decisions on what are necessities, what are frills, and what falls in a debatable middle ground?" (p. 116). (Compaine, 2001).

However, the consensus in the literature is not in favor of a "hands-off" approach. Policy-makers and researchers agree that a persistent gap in ICT access is neither fair nor socially desirable, and that something needs to be done—yet, the ethnic digital divide is a problem that permits no easy solutions.

People with Disabilities: Though the notion of universal service has been around for quite sometime, the provision of service to people with disabilities did not become an issue until recently. There were perhaps two main reasons for this lag. One, the movement for the rights of the disabled came into its own only recently. Two, the increasing role of ICT in everyday life raised the importance of the issue of access within the disabled community. We will first discuss these two factors before delving into the literature on universal access for people with disabilities.

For much of history, the disabled were seen as passive recipients of medical care; or as objects of pity in need of charity; or as constituencies requiring the management of their "special needs" or "special arrangements" (Goggin and Newell, 2000). In opposition to these paradigms based on "ableist" norms, the disability community has been putting forward a paradigm based on rights. This paradigm broadens the focus beyond the disable individuals to the social system within which they have to operate. For example, the British theorists "propose a distinction between an individual's impairments (the bodily dimension) and disability which is socially produced (as in the barriers society unfairly creates for the person with impairment, for instance)" (Goggin and Newell 2004, p. 412).

Accordingly, the attention is directed towards eliminating the barriers that exacerbate if not create problems for people with disabilities.

In terms of telecommunications systems, the rights paradigm calls for an awareness and sensitivity to the needs of the disabled at the time of the design of these system instead of the current practice of developing adaptive devices after the system has been created. In other words, the needs of the people with disabilities should not be an afterthought (Stephanidis 1998, Vanderheiden 1990). Disability advocates point out that this approach is not only a nice idea but also a practical one because the rapid pace of technological change is increasingly making the reactive approach untenable. Soon after posteriori adaptations are made for a new technology, it is made obsolete by an even newer technology and the same cycle has to be reinitiated (Stephanidis and Emiliani 1999). A better approach would be to proactively develop "generic solutions," as early as possible in the design process, that result in products and services that are usable by the widest possible range of users, including people with disabilities. This approach, which would minimize the need for posteriori adaptations, is "grounded on the notions of universal access and design" (Stephanidis and Emiliani 1999, p. 24).

The universal design concept is oriented towards designing the system in such a way that it is usable by the broadest possible population base, including people with disabilities and the elderly (Stephanidis et al. 1999). In the ICT realm examples include power switches on the computer's front face, adjustable keyboards, and user's ability to control sound volume, brightness of the screen, and position of the monitor (Shneiderman 2000). Universal design benefits not just the disabled but also the community at large. Pay phones designed for comfortable use by wheelchair and scooter users also help parents with strollers. In addition to helping people with dexterity and mobility problems, telephones with big buttons and hand free operability are useful for the elderly. TTY services not only enable the hearing impaired and speech impaired subscribers to communicate with each other but also the rest of the community with them (Goggin and Newell 2000).

In terms of telephone regulation, until recently universal service was seldom interpreted to include the needs of people with disabilities (Bowe 1993; Goggin and Newell, 2000, 2004; Ransom 1994). Service providers especially were resistant to the

idea of providing non-standard equipment for disabled users. However, recent court cases and legislation have succeeded in creating new obligations in equipment, both in the U.S. and abroad. In Australia for example, a complaint (Scott, DPI v Telstra) before the Human Rights and Equal Opportunity Commission (HREOC) forced Telstra, the telecommunications service provider to provide alternate equipment in case the standard equipment proved to be unusable by any subscriber group (Bourk 2001). Subsequently, the 1997 Telecommunications Act broadened the universal service definition to include the functional requirements of people with disability. Carriers were now obligated to provide a functional equipment of voice telephone service to subscribers who needed it (Goggin and Newell 2004).

In the US it was the ADA that explicitly dealt with the telecommunications needs of people with disabilities. Title IV of ADA guarantees to users of teletypewriters (TTY) "full and equal access" to the public telephone network. The TTY service allows hearing-impaired and speech-impaired users to send text messages to relay operators who then read them out to non-TTY users and correspondingly relay back the spoken message as text. It, however, still left out many people who had problems due to cerebral palsy, visual-impairment, learning disabilities, and other disorders. Deborah Kaplan, director of technology policy of World Institute on Disability (WID), organized an effort to extend similar benefits to other disabled groups (Bowe, 1993). She based her strategy on the Television Decoder Circuitry Act that required the manufacturers of television sets to install special chips in all televisions to ensure access by the hearing impaired, instead of requiring the latter to buy special devices. The resulting economies of scale brought down the additional cost to as little as $5 per set. She sought to do the same for the public telephone service by requiring services such as speech synthesis and speech recognition to be part the overall fabric of the network. These capabilities would allow visually impaired users to listen to information, hearing impaired to print out voice messages, and quadriplegia to dial numbers by speaking them aloud (Bowe 1993). Kaplan argued that not just the disabled, but also the elderly, the rural population, and others will benefit.

The 1996 Telecom Act does not incorporate disabilities issues in the universal service section, Section 254. It deals with the disabilities issues in a separate section, Section 255. After concluding the proceedings for developing rules for Section 255, FCC

adopted the "readily achievable" concept from the ADA. According to this concept, carriers are only obliged to make changes for people with disabilities when it is "easily accomplishable and able to be carried out without much difficulty or expense" (quoted in Kanayama 2003, p. 189). While the industry groups applauded FCC's decision to devise its own analytical factors (feasibility, expense, and practicality) for determining "readily achievable," the advocates of people with disabilities expressed dismay: instead they argued that the FCC should focus on "the functions of peripherals commonly used by people with disabilities" (Kanayama 2000, p. 190).

The recommendation that the FCC identify the features "commonly used by people with disabilities" is noteworthy. One of the criteria that policymakers have often used for inclusion of new services in an expanded universal service package is that its value be demonstrated by wide acceptance by ordinary consumers (Sawhney 2000, 2003). For example, the second criterion laid out in the Telecommunications Act of 1996 asks the FCC to consider a new service for the universal service package when it has "through the operation of market choices by customers, been subscribed to by a substantial majority of customers" (Section 254 (c)(1)). Here the disability advocates are arguing that the "consumption norms" (Preston & Flynn, 2000) within a disadvantaged group instead of the entire population be used as the criteria for including a service in the universal service package.

An increasingly contentious issue centers on the legal status of websites—are they products, promotional vehicles, services or "places of accommodation"?—that will lead to different standards of accessibility to be imposed on providers. Maguire v Sidney Organizing Committee for the Olympic Games (SOCOG) was a landmark case in this regard heard before Australia's Human Rights and Equal Opportunities Commission (HEROC). Maguire, a blind person, complained a year before the start of the Olympics that a number of features of the Sydney Olympic Games website was inaccessible via the refreshable Braille display and screen reading technologies used by visually impaired Internet users. HEROC ruled that the website violated the 1992 Commonwealth Disability Discrimination Act that prohibits discrimination in service provision, dismissing the Organizing Committee's arguments that the website was not a service but only a promotional vehicle, and that the cost of reconfiguring the website would impose

an "unjustifiable hardship" on it. HEROC called for specific changes by November 6, 2000 and later fined SOCOG Australian $20,000 for not fully complying with the order (Russell 2003). While the court order in Maguire v SOCOG was significant, it did not have wide spread impact as one would have expected. In fact even the Athens Olympic website generated many complaints. In the U.K. the issue still remains unresolved whether the Internet constitutes a "service" and thereby falls within the remit of UK Disability Discrimination Act 1992 or whether it is a "product" and not subject to this disability related law (Russell 2003).

The legal status of websites has also been an issue in U.S. courts. The Americans with Disabilities Act 1990 (ADA) states that people with disabilities cannot be discriminated against in accessing "places of accommodation," examples of which include hotels and grocery stores—the question of contention now is whether or not websites constitute "places of accommodation." In a case brought about by Access Now, an advocacy group, against Southwest Airlines, the court concluded that websites were not "places of accommodation" as per ADA, which was concerned with access to physical spaces and not virtual ones (Russell 2003). Interestingly, in a case (Carparts Distribution Center v. Automotive Wholesaler's Association of New England) that did not involve web accessibility, the court determined that the term "public accommodation" was ambiguous and could be intangible "accommodations" such as a health benefit plan. In another case [Vincent Martin et al. v M Metropolitan Atlanta Rapid Transit Authority (MARTA)] the court ruled against a transport authority for violating the ADA mandate "of making adequate communications capacity available" because its website was not accessible and its alternate means of access via Braille schedules was not easy to use (quoted in Russell 2003, p. 243). These contrasting outcomes stem to some degree from inconsistent provisions in the hodge-podge of laws that govern accessibility standards (Russell 2003).

Thus we see that much of the struggle has been to extend universal access beyond simple availability of a connection to accessibility. Otherwise, as advocates of people with disability warn us we will end up with a "two-tier" society of "haves" and "have-nots" (Stephanidis 1998, Stephanidis 1999 et al.) or as Kanayama (2000) says of those who "can" and who "cannot."

Digital Libraries: The dream or fantasy of creating one source of all the world's knowledge has been with humankind since time immemorial (Harris, 1995). In the eighteenth century, the French encyclopedists led by Denis Diderot nurtured the ambition to create an alphabetical listing of all human knowledge, and to make it accessible to all. That dream animated twentieth century thinkers to visualize devises such as the 'memex' or 'memory extender' (Bush, 1945), or an entirely computer-based "library of the future" (Licklider, 1968). These notions however remained unrealized until the Internet came into existence. The enormous potential of the Internet to catalog information, and make it simultaneously available to millions of users anywhere on the globe has put a universal storehouse of within reach. In is therefore no wonder that the idea of digital libraries has recently gained considerable traction.

The term "digital library" emerged out of a series of workshops sponsored by the National Science Foundation in the early 1990s as part of the Digital Library Initiative (Fox, 1993). As discussed in Borgman (2000), it did not take long for the idea of digital libraries to take root in the United States and gain policy support at the highest levels of government. Digital libraries were designated as a "national challenge application area" under the High Performance Computing and Communications Initiative (HPCC) and it was also identified as a priority under the National Information Infrastructure Initiative. The National Science Foundation took a lead in coordinating digital library initiatives internationally. Other countries such as the United Kingdom too have made a major commitment to digital libraries. The Group of Seven industrialized nations (formerly the G-7, now the G-8) have digital libraries as a prominent component of the Global Information Infrastructure initiative (Borgman, 1999).

A variety of meanings have been attached to the term "digital library": for example, a digital library may be defined as institutions that catalog information and provide electronic access to it; the databases itself of texts, images, data, audio etc.; the software for search and retrieval from distributed networks; or specific services provided using a combination of all of the above (Borgman, 1999, 2000). Given the multiplicity of meanings, there is no consensus on what a digital library is, or should be. Depending on how narrowly or broadly one wants to describe a digital library, it could be as narrowly defined as a digital version of the traditional library with a physical location, permanent

collections, authorized access and human assistance in case of need; or the vast, spatially distributed, freely accessible but non-authoritative environment of the internet itself (Harter, 1997). At either extreme, a different set of policy questions and problems are raised for universal access—so it is instructive to examine the different dimensions along which a digital library is similar to, and different from the traditional library. These dimensions—location, content, user access, intermediaries and pricing—are identified loosely based on the work of Stephen Harter (1997). Each dimension is discussed below.

Traditional libraries have a specific location for their collections, serve a clientele that is also generally concentrated at a proximate location, and are quite often funded by entities (taxpayers, universities, foundations etc.) that have a concentrated physical presence. Digital libraries have no physical presence—indeed, one of the advantages of digital libraries is that they do not require proximity as a condition for access. Once content has been digitized, cataloged and placed online, it can be accessed from anywhere in the world. And since access can be provided at very little additional cost to a much broader set of users, it makes economic sense to provide access universally once the content has been created. Indeed, the trend in the digital library movement is the creation of a "global interconnected library network" (p. 49) comprising collections at different national and international locations(Schatz & Chen, 1999) However, this lack of a physical presence and potential universal access also leads to dilemmas—should libraries create local facilities (reading areas, physical collections, computer terminals etc.) or digital services (digitization, archiving and storage, server maintenance, telecommunications)? Given the interconnected nature of digital content, there will always be a tendency to free ride (Adar & Huberman, 2000). Significantly, one of the questions early planners in the United States asked was what economic advantage the United States would gain from the creation of digital libraries, when its competitors too would have access to the same content over the Internet (Fox, 1993). This debate about digital library spending priorities has clear antecedents in long-standing attempts in the education community to quantify the benefits to local communities from education spending (Fisher, 1997; Moretti, 2004; Justman & Thisse, 2000, Strathman, 1994).

Turning to content, one of the functions of the traditional library is to authenticate content in terms of its authorship, fidelity to the original text, legality in terms of

copyright, and ideally, the accuracy of information (Harter, 1997). Digital libraries cannot reasonably be expected to provide this service to users. First, digitized content can be easily modified and distributed by anyone with the requisite know-how making it more difficult for libraries to authenticate the source of every item. Second, no digital library can be expected to archive all of its content on its own storage resources—it is just more practical to interlink databases and institutions. But this also implies that no digital library would have complete control over the content that it makes available to its users. Third, the threshold for unauthorized duplication and distribution is much lower for digital content, making copyright protection a more serious problem in digital environments. Industry groups have promoted the idea of technological protections for digital content, under the broad rubric of Digital Rights Management (DRM) as a way of authenticating content in its various aspects—authorship, genuineness, legality, accuracy etc. A number of technologies—encryption, "marking", "fingerprinting" etc. have been evolved to protect copyrighted content (Godwin, n.d.). These technologies of "content management" have gained legal sanction through the Digital Millennium Copyright Act (DMCA) of 1998, but some observers have argued that such technological fixes reduce access to digital content, as well as restrict some of the "fair uses" permissible under copyright law (Free Expression Policy Project, 2003; Gillespie, 2004; Jackson, 2000).

In terms of user access, traditional libraries have usually served a well-defined user population, either on a geographical basis (the town public library), or on the basis of academic/ professional specialization (the law library)—general depository libraries like the Library of Congress being the exception. The users of a digital library need not necessarily share in a social network, even though they share certain interests in common. While this disjuncture creates unique challenges, it is also not without its positive aspects. Digital libraries open up the possibility of providing access to groups that share a common interest but not a physical location—who could not be served earlier because of the need for proximity. However, a geographically dispersed user base has its own unique challenges: diverse expectations of cultural acceptability and relevance, different standards of copyright, the need for translation and transliteration services, platform independence, etc. (Hutchinson et al, 2005). And every layer of software complexity

creates additional problems of access for users whose local systems are not capable of handling the required protocols.

Human intermediaries play an important role in traditional libraries, helping users to catalog and retrieve information (Fox, 1993). Library professionals interact with users, interact and modify information resources, and add value to the user-information resource interaction by mediating between the two (Brewer, Ding, Hahn, & Komlodi, 1996). In the online environment, these services are provided by software agents. Thus, the design properties of digital libraries, including both functionalities and analytical categories becomes important (Borgman, 1999). Functionality includes "retrieval mechanisms, navigation tools, display capabilities, import and export of content to other applications and various user-interface features" (p. 164), while analytical categories refer to "aspects of organizing knowledge, intellectual content, access points and hierarchies" (p. 164) (Borgman, 1999). Users need to be more sophisticated and skilled in online environments than in the traditional libraries in order to more fully utilize the wealth of information available in digital libraries. However, the increasing sophistication of software agents is a mitigating factor: witness the emergence of a search engines like Google, and the acceptability that it has earned even in academic research environments. Nevertheless, challenges remain in integrating databases and services from multiple digital libraries, to provide the user with a seamless search and retrieval environment, i.e. "semantic interoperability" (p. 48) (Schatz & Chen, 1999).

Finally, digital libraries also have to contend with the issue of pricing. Traditional libraries have functioned largely on a non-profit basis, supported by subsidies from government, charitable foundations and others. Most services in traditional libraries are also provided for free, because of the economic and social benefits of the free flow of information and the importance of an informed electorate and with enormous implications for universal access. Unfortunately, the transition to the digital environment threatens to unravel free service. The traditional model in which libraries paid higher prices for the purchase of information goods such as books and scholarly journals, but in turn were allowed to lend to an unlimited number of users at no additional cost fails because of the easy shareability of information between users and the location-independence of digital resources (Eisenhart, 1996). Digital libraries would be required to

move to some form of usage-based pricing in the new production environment (Borgman, 2000; Adam et al. 1996). In addition, financial transaction systems such as "micropayments" would also need to be instituted. A move towards for-fee digital library services will make universal access dependent on the affordability of services; access to financial instruments such as credit cards or electronic bill-pay; and the complexity of additional protocols for user identification, accounting and privacy protection.

Rural Broadband: It is only in modern times that it has become a disadvantage to be rural. The urban advantage, the converse of rural disadvantage, is the modern infrastructure made possible by the available economies of scale that the rural areas lack because of the sparsely populated land mass. In the ICT realm this tension has led to recurrent calls, with every significant technological advance, for policy interventions to bring about urban-rural parity so that the rural populations are not left behind. At the turn of the last century, the big issue was Rural Free Delivery of mail (Roper, 1917; Fuller, 1964). Thereafter there were calls to extend telephone service to rural areas, in response to which funding was provided from the Rural Electrification Administration and through internal cross-subsidies from urban to rural services (Brock, 1981; Fischer, 1987; Mueller 1993). With the arrival of digital technologies, especially ISDN, alarms were again sounded about rural areas getting left behind and the researchers dutifully documented the inequity in the deployment of the new technology (Gabe and Abel, 2002). Soon enough, there were studies recording the inequities in access to Internet (Downes and Greenstein, 1999; Greenstein, 1998; Grubesic, 2002; Malecki, 2002, 2003; Nicholas, 2003; Strover, 2001). Today, the discussion has moved onto broadband and as we will see below we have a virtual replay of old concerns with regard to yet another new technology. With each successive technology, the same pattern tends to repeat itself (Sawhney & Sandvig, 2004).

In keeping with this repeating pattern, there have been empirical studies showing urban-rural gap in broadband deployment (Gillet and Lehr, 1999; Grubesic and Murray, 2002; NTIA and RUS, 2000; Strover, Oden, and Inagaki, 2001; U.S. Department of Commerce, 2000). They have been accompanied by studies that examine the different factors such as demand (Hollifield and Donnermeyer, 2003), costs (Glass, Chang and Petukhova, 2003), competition (Grubesic and Murray, 2004), technological development

(Glass, Talluto, and Babb, 2003), and effectiveness of current policies that impact broadband deployment (Gabel and Kwan, 2000; Grubesic, 2003; Strover, 2003). Others have offered strategies for broadband deployment that include varied solutions for different locales (Parker, 2000), community networks (Matear, 2002; Rowe, 2003; Skerratt and Warren, 2003), and demand aggregation (Leatherman, 2000; Parker, 2000; Hollifield and Donnermeyer, 2003).

Then there are authors making a case for policy interventions to further broadband deployment, which is seen as having widespread benefits across different sectors—health care, education, e-government, entertainment, and commerce (Leatherman, 2000; Parker, 2000; Kalhagen and Olsen, undated). Others focus on implications for a specific sector such as rural small businesses (Allen, Johnson, Leistritz, Olsen, and Sell, 1998, Locke, 2004). In terms of the big picture, the case for rural broadband is made around the four points. First, comparing broadband to railroads and highways, authors express the fear that communities unconnected to broadband networks will face the same fate as those that were bypassed by railroads and highways in an earlier era (Parker, 2000; Worstell, undated). Second, evoking the principle of urban-rural parity, authors call for investments in rural broadband (BJK Associates, 2001; Crandall and Jackson, 2003; Hollified and Donnermeyer, 2003; Kruger, 2005). For example, Hollified and Donnermeyer (2003) argue that rural areas need broadband access for local businesses "to remain competitive in the global information economy" and for schools and local governments "to provide services to their constituents comparable to those available to urban-based citizens" (p. 136). Third, authors justify investment in rural broadband pointing to the system-wide benefits or network externalities. For example, Crandall and Jackson (2003) argue that rural broadband would save healthcare costs through telemedicine—here, the emphasis is not on promoting equity alone, but on the benefits to the larger system through cost reductions in service delivery. Finally, authors may use an analogy with an earlier technology to make a case for including broadband in the universal service package. For example, Matear (2002) argues that "just as universal access to traditional communications media, such as the post office and the telephone, is considered an essential service, so also should access to high-speed Internet, particularly in areas that currently lack the infrastructure to make this possible" (p. 461).

Rarely does a researcher seek to evaluate the actual impact of broadband availability on rural population (LaRose, 2003). It is generally assumed, which an exception of few skeptics (Prieger, 2003; Xavier, 2003), that rural broadband is inherently good. Xavier argues against the inclusion of broadband in universal service package. In fact he says that the aim of his paper is to "exert a moderating influence on (the, at times, exaggerated) calls for government support / subsidies to broadband deployment" (Xavier, 2003, p. 8).

Extending universal service to new socio-technical domains

Our experiences with the precedent-setting systems reveal the structural elements of universal service: the core principles that support and animate the concept; the precedent provided by the proto-systems; and a policy vocabulary that can apparently be re-applied to any new domain of discourse. We now turn to the processes by which the universal service ideal is "trans-generated" (a neologism of our own coinage to signify both the transference of the concept to new domains of policy discourse, as well as its regeneration in these new fields) and used to advocate for universal service in new socio-technical systems as they emerge. To this end, we examined four domains—minority access, access for the disabled, digital libraries, and rural broadband—to analyze how universal service has been interpreted. Two processes of which examples were noticed in the reviewed domains—"stretching," and "back to the basics"—are described below.

Stretching: In the literatures on disability and digital libraries we see the starkest examples of stretching. While in the disabilities cases stretching led to successful outcomes, in the case of digital libraries it has proved to be a restraining factor in the development of new ideas.

In Australia disability advocates were successfully able to argue that Telstra's universal service obligations did not end with simply providing connectivity. They argued that any technical equipment was merely a means of enabling subscribers to communicate with others. If the standard equipment was unable to do so for a subscriber group, then the telephone company was obligated to provide alternate means. This stretching of the notion of universal access from hardware provision to usability first

convinced the Human Rights and Equal Opportunity Commission and then the legislature to redefine the universal service obligations of the telephone company.

Perhaps the most outright examples of stretching are the arguments for making websites accessible to people with disabilities. Quite clearly the lawmakers were thinking of only physical spaces when they wrote the Americans with Disability Act (ADA) as all the places mentioned in the statute are physical. Yet disability advocates have been able to make quite a compelling case that Web sites should also be considered to be "places of accommodation" and hence within the purview of the ADA. There is no doubt that as more and more transactions and services move online, the case for accessible websites becomes ever more pressing. The big question is how far should the accessibility requirements go for Web sites. In 1996 the Department of Justice's Civil Rights Division issued an opinion, which does not have the force of law, that ADA applies to Web sites. A separate law requires that federal sites created after August 7, 2000 should be accessible to people with disabilities. In 2000 National Federation of the Blind and the Connecticut attorney general got four tax preparation services to agree to make their Web sites accessible (Heim 2000, Sager 2000).

The extension of conceptualizations of a traditional library to the new Internet-based digital library is also an instance of stretching. What we call the digital library has none of the attributes of the traditional notion of the library: a quiet and friendly neighborhood place with helpful professionals on hand, where you can browse among the bookshelves and check items out at no cost. "The metaphor of the traditional library simply does not apply to the Internet; most of the values and properties of the traditional research library are absent" (online) (Harter, 1997). In the words of Douglas Greenberg, "The term 'digital library' may even be an oxymoron: that is, if a library is a library, it is not digital; if a library is digital, it is not a library." (quoted in Borgman, 2000, p. 38). Yet, we persist in conditioning our expectations of digital libraries (electronic information databases) on our experiences with traditional libraries. Here we need to let go of stretching of the library metaphor and get into the "back to the basics" mode and think through the fundamentals.

Back to the Basics: We will revisit the core principles identified earlier and see the extent to which they are employed in the reviewed literatures. First, we identified a

belief in the social and economic benefits of information flow and exchange. This principle, wherein information flows are seen as binding the society together, is so deeply embedded in our minds that we taken it as a given. It is only when a writer like Schivelbusch questions the notion that "communication, exchange, motion brings humanity, enlightenment, progress and that isolation and disconnection are evidence of barbarism and merely obstacles to be overcome" (Schivelbusch, 1978, p. 40) that we give pause to think otherwise. In the literatures reviewed we did not find a single case of anybody arguing against information flow and exchange, whereas it is not difficult to imagine legitimate arguments against it—the loss of local cultural autonomy, the increasing commercialization of information and entertainment, the decline of community life. There have been authors like Compaine (2001) who have argued against universal service programs in telecommunications. But their objection is against policy interventions and the concomitant expenditure of public resources. They are not against information flow and exchange per se.

The second core principle is that universal access cannot be provided without an organized systemic framework. Among the literatures reviewed, the need for an organized systemic framework is most explicitly an issue in the case of rural broadband that depends on subsidy flows from one part of the system to another. In fact without these subsidy flows rural broadband may not be be possible. While the need for an organized systemic framework was not explicitly discussed in the case of minorities and people with disabilities, its existence is an implicit assumption because cross-subsidies, rather than direct government grants, has been the traditional way of funding initiatives in these areas. In the case of peoples with disabilities, Kaplan provides a new twist when she argues that speech synthesis and speech recognition technologies should be incorporated in the very design of the network and the costs should be spread out across the entire subscriber base. It is important to note that the economies of scale advocated by Kaplan would generate a different kind of subsidy than what has traditionally been used in the telephone industry. While traditional subsidies increase price of service (not cost) for users who provide the profits for the subsidies, economies of scale would increases their costs. This different is noteworthy even if what matters to the customers are the prices they have to pay.

The third core principle was that the organized systemic framework should not let the metropole dominate the hinterland. Interestingly, while control by the metropole was a major issue in the case of the postal system and broadcasting, it was not a major issue in the literatures reviewed. The digital libraries literature mentions the tradeoff between creating local resources (reading spaces, parking etc.) and globally-accessible resources (databases, telecommunication links)—but the economic incentives encourage a digital library to favor local investments and free-ride on resources available on the network. However, a concern for localism does not animate the other literatures significantly. One explanation is that with globalization this debate has now moved to the global level.

The fourth core principle states that government subsidies or regulatory actions should not favor one commercial provider over another. This principle continues to be operative especially in the telephone industry where the transition from a monopoly to a competitive market and also the proliferation of technologies that deliver essentially similar services has made regulatory neutrality a major issue. The regulators seek to ensure that they neither favor one competitor over another nor one technology over another.

Finally, we have the expectation that there should be uniformity in access across regions and social strata. This principle is most clearly evident in the rural broadband literature, areas where mitigating the rural disadvantage is the primary concern. Geography is also an important issue in the minorities access literature because of concerns about redlining and the need for parity between the poor parts of urban areas, usually inner cities in the U.S., and the rest of the system. Concerns about equity across social strata permeate all the literatures. We very often hear warnings about a "two-tier" society, "second-class citizens," "haves" and "have-nots." In the case of people with disabilities, Kanayama (2000) even provides a new twist to the familiar theme—those who "can" and those who "cannot."

In summary: A universal service 'trans-generation' model

So far in the paper, we have seen how a common conception of universal service emerged out of our historical experiences with a set of precedent-setting socio-technical systems. Our experiences with the proto-systems also reveal a set of common cultural

antecedents, ideals and tendencies—the core principles—that underlie our notion of universal service. These core principles emanate from the culture and values of a society rather than the particulars of any specific technology. We identified some of the core principles revealed by out experiences with the proto-systems: a belief in the social and economic benefits of information flow and exchange; the need for an organized systemic framework to ensure universal access; the call to preserve local autonomy against domination by the metropole; the need for regulatory neutrality vis-à-vis the market; and the egalitarian stress on uniformity in access across regions and social strata.

The process by which universal service was articulated in these systems as they emerged was incremental, non-linear and heavily contested. Yet, later observers reconstructed an imagined history of these systems that provided coherence, goal-directedness and linearity to these developments—for example, by attributing a noble vision and remarkable prescience to the early educational innovators who, in the reconstructed version of events, "laid the foundations" for our modern systems of education. The compromises, back-and-forth movements and the divergent agendas that resulted in the national educational system we know today were ignored in this imagined history. It is this imagined history that provides the template for the development of universal access in newer socio-technical systems.

In addition to the core principles and the imagined history of proto-systems, our historical experiences have also generated a policy vocabulary ("haves and have-nots", "redlining," "public interest") to animate discussions of universal service in new socio-technical systems, as well as a set of policy instruments (cross-subsidies, rate averaging) to convert the universalist ideal into practice. When this policy vocabulary is reapplied to new regulatory contexts, we witness an *anatomization effect* (decontextualization). Regulatory concepts developed in interrelated clusters in the course of the development of the precedence setting systems. However, when this historical repertoire is accessed for a new technology, individual concepts get picked as if they were freestanding concepts. Often the original meaning of these concepts is forgotten and the interrelations between them are overlooked. The historical precedent becomes a repertoire of free-floating concepts dislodged of their historical context. For example, the "public interest convenience and necessity standard" current in broadcast policy owes its

conceptualization to public utility law, where it originally covered the obligations of tramcar and railway line operators (Caldwell, 1930). As radio regulations were being framed in the 1920s, policy makers picked up the phrase that everyone would recognize as standing for something concrete while being flexible enough to cover all possible future applications of radio technology. Today, the PICON standard has been so overused (and some would say abused) that it stands for anything and everything.

Our examination of four new policy domains in which scholars are engaged in making a case for universal access reveals the processes by which universal service is "trans-generated" in new fields of discourse. Appeals are made based on the core principles that support and animate the universalist ideal; the precedent provided by the proto-systems; and a policy vocabulary that can apparently be re-applied to any new policy domain. Several examples of "stretching," and "back to the basics" were noted in these new domains. Universal access is a fertile concept that seems to have struck deep roots in our minds—giving it a fresh lease of life with every wave of new technology.

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