

## **Conclusion: ICT and Pro-poor Strategies and Research**

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### **Abstract**

This chapter amalgamates the different themes raised in this first collaborative initiative of the Regional Dialogue on the Information Society (REDIS-DIRSI). The research undertaken by the network addresses ICT demand and supply side issues, regulatory reform and the private sector, consumer advocacy, new ownership models for network service provision and emerging network technology solutions – especially from a pro-poor perspective. Accordingly, this concluding chapter traverses the different thematic areas, fitting them together both in terms how they inform and feed into each other, and in context of assessing the Latin America and Caribbean ICT terrain from a REDIS-DIRSI perspective.

The chapters in this book comprise the first collaborative initiative of the Regional Dialogue on the Information Society (REDIS-DIRSI), a Latin America and Caribbean research network committed to investigation, analysis, and developing pro-poor strategies for extending access to ICT resources within the region. Compounding the overarching fact of disparate levels of ICT access across countries and regions, clearly there are also policy and regulatory divergences, with vast apparent differences between nations' abilities to devise appropriate and effective information society policies, regulators' institutional capabilities and experience, and national legal frameworks, democratic traditions, and social infrastructure – all of which have bearing on future ability to participate in the information society and economy. Despite variance in the national level foundations for transcending weak ICT sectors, three things remain relatively constant:

- 1) The emerging “information society” and “information economy” give the telecom sector an exaggerated importance in determining the shape of modern economies and societies. A key element for devising effective policies are accurate and detailed assessments of the current ICT terrain.
- 2) Regulation is increasingly complex. Some of the primary contributors to this complexity include the changing nature of the companies being regulated (privatized, foreign-owned, multi-industry players), and the impact of new and converging technologies. For Latin America, the encroaching re-concentration of the telecom sector is of particular importance.
- 3) Policy and regulation play important roles in shaping the roll-out, affordability, quality, etc., of information infrastructures and of balancing the many competing interests concerned with such a central infrastructure. Protection of the consumer and universal service are particular challenges for LA&C.

This Conclusion surveys the issues raised in the proceeding chapters. The overarching framework for the different analyses has been to grapple with identifying the necessary conditions to continue (or indeed put back on track) the impetus of regulatory reform and to extend ICT network sector growth for the LA&C region. In addition to strategies for affordable access, much of the work here is preoccupied with accurate assessments and accurate definitions of information and digital poverty, rather than relying on more generalized notions such as the “digital divide”. New methodologies and indicators are viewed as essential starting points for creating policy to stimulate pro-poor adoption of ICT and effective and innovative uses of network infrastructure.

## 1. Indicators and Measuring Demand

In the good old days of POTs (plain old telephone service), teledensity was the essential indicator for taking the pulse of a country's infrastructure roll-out. A few other key indicators (such as mainlines per employee, faults per mainline, waiting lists, etc.) documented the efficiency and robustness of service provision.

With evolving infrastructure there is an urgency to develop new indicators to better assess progress and to identify both gaps and readiness for information society needs.<sup>1</sup> The Economist Intelligence Unit (EIU), for example, has just released its yearly e-readiness ranking for 2005. "A country's e-readiness is essentially a measure of its e-business environment, a collection of factors that indicate how amenable a market is to Internet-based opportunities."<sup>2</sup> There has been much attempt in regulatory and ICT literature to correlate telecom infrastructure and economic growth. Not surprisingly, the methodology and ranking for the EIU study corresponds to evidence sought to demonstrate healthy regulatory environments and corresponding attention to universal service and access programs.

Of the LA&C countries forming part of the 65 countries surveyed, Table 1 shows their ranking in the EIU e-readiness study.<sup>3</sup>

Table 1: EIU e-Readiness Ranking

Country	Rank (out of 65)
Chile	31
Mexico	36
Brazil	38
Argentina	39
Jamaica	41
Venezuela	45
Colombia	48
Peru	50
Ecuador	55

Source: Economist Intelligence Unit (2005).

<sup>1</sup> For more detail on new indicators and measuring digital poverty, see also Minges (2005).

<sup>2</sup> EIU (2005).

<sup>3</sup> The EIU categories thus comprise: connectivity and technology infrastructure 25%; business environment 20%; consumer and business adoption 20%; legal and policy environment 15%; social and cultural environment 15%; and supporting e-services 5%. The EIU methodology weights infrastructure roll-out the highest – with the category criteria encompassing penetration of narrowband, broadband, mobile phone, Internet, PC, WiFi hotspots, internet affordability, and security of internet infrastructure.

The EIU ranking – and other methodologies – make it clear that economic development opportunities for countries become exponentially better as their score increases. Simply put, countries that have already achieved a high level of infrastructure roll-out have the luxury of allocating ICT spending on enhanced usage of ICT, rather than being bogged down in the intricacies of network roll-out and basic access. Or in other words, “[I]t is not simply that people in high-income countries have hundreds of times as many radios, televisions, phones, and other appliances than their counterparts in low-income countries. As the demands for the basic devices and services are satiated, other demands start to be filled. Countries begin to develop ICT-intensive industries and to intensify the ICT inputs to other, more traditional industries.”<sup>4</sup>

Roxana Barrantes in her chapter (chapter 2) argues in the same vein, that those who are excluded from the network risk devolving into a vicious cycle of not having sufficient information about new technologies and services to engender demand based on perceived benefits. The definition of e-readiness is thus problematic – or inadequate in its assessment of levels of economic development for advanced e-commerce and e-services. At the other end of the spectrum, ICT for development and digital divide agendas have been preoccupied with affordability and access to a basic bundle of goods and services.

Barrantes emphasizes the importance of differentiating between *digital poverty* and *digital divides*. The latter concept has been the focus of much hype and generalization – typically summarized in terms such as ICT *haves and have nots*. Conversely, the notion of digital poverty attempts to define and measure the minimum levels of entry into ICT markets – the conditions required to create a basic level of informed demand. Thus, digital poverty can affect any segment of the population (not only the poor), and can be the result of different factors including economic poverty, supply-side failures, and insufficient information regarding benefits. By way of example, in her study aimed at better informing Peruvian information society policies, one-third of Peruvian households fell into the category of *extreme digital poverty*, compared with 18% of households identified as subject to *extreme economic poverty*.

Thus, there can be no single prescription for solutions to achieve universal service, simply because there are different reasons for the failure of the network to reach all potential consumers of telecom services. Gover Barja (chapter 1) furthers this discussion and proposes methodology for measuring *information poverty* (in contrast to digital poverty) based on assessing the differences between localities within

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<sup>4</sup> See Daly (2004).

countries – rather than between countries – with his methodology comprising factors that underlie both supply and demand side limitations.

In a post-privatization context, market actors may not choose to service areas that are perceived as unprofitable – these include rural areas where it is costly to extend physical infrastructure and where lower population densities imply reduced demand and hence reduced revenues. It is often claimed that failure to extend the network occurs due to market factors such as lack of economies of scale in extending the network and offering service. However, it is increasingly found that poor and marginalized communities are willing to spend proportionately higher amounts on telecom services than in places with developed infrastructure. It has also been demonstrated that viable markets exist where network operators fear to tread. Thus, we need better models for assessing whether unmet universal service objectives constitute sites of market failure, or poor regulatory environments. Barja's methodology attempts to capture these elements at a local level, and further to quantify the cost of equal access across communities in a particular country.

By way of example, a key difference between developed and developing country ICT environments is access outside of key cities. Rural access problems do persist for already developed economies, but tends to manifest at the level of broadband access to Internet services rather than a paucity of any ICT resources at all. Hence, universal access programs for developing countries will have a very different focus than those in countries with more mature infrastructure. "Almost half (46%) of LA&C lives at population densities below 150 (a conventional threshold for urban areas), and more than 90% of this group is at least an hour distant from a city; about a third of them (18% of LA&C total) are more than four hours' distant from a large city."<sup>5</sup> Barja argues that we need to assess this factor at a more local level, and to contextualize it in terms of other national factors (such as reach of the network, ability to use the technology, connectivity issues and relevant content) – which combined, allow for a national-level baseline measurement of information poverty, and a possible calculation of national level cost for its eradication. This level of detail is imperative for effective and realistic pro-poor strategy formulation for access gaps.

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<sup>5</sup> Chomitz, Piet Buys and Thomas (2005).

## 2. Extending the Network's Reach

### 2.1 MOBILE TELEPHONY

As is well-documented, the growth of the mobile network worldwide during the past decade has achieved in expansion of access to the telecom network what years of universal service programs have failed to deliver. Mobile telephony has proven effective in developing economies because it is increasingly affordable and flexible. Further, the fact of pro-poor use of available telecom infrastructure has actually altered the economics of telecom provision, forcing the pervasiveness of a low average revenue per user for the market segment. Prepaid, shared use of handsets, texting, ring-call-back, and micro-financing of service vendors are some of the strategies that the poor use to make access to the telecom network affordable. It is these kinds of strategies that have made mobile telephony ubiquitous in countries that are still unable to provide adequate fixed-line infrastructure.

By the early 21<sup>st</sup> century, mobile expansion was no longer such a surprise, and the question of mobile telephony overtaking fixed line became a question of *when* rather than *if*. For Latin America, this happened in 2001. In early 2005, there were 176 million mobile phones in Latin America – compared with 92 million fixed line phones.<sup>6</sup> As noted by Judith Mariscal (chapter 3) mobile telephony is the predominant form of network access by the poor in the LA&C region.

The initial surge of mobile expansion occurred during a period of liberalization and opening up of markets. In order to attract investment in these markets, there was a high degree of concern to demonstrate regulatory oversight on issues such as interconnection, competition and level playing fields for service provision. Mobile service provision was typically the first segment of the telecom market to be open to competition in most countries; and there were national level advantages to providing sufficient conditions to attract investment.

Now, however, as documented by Mariscal, many Latin American national markets are undergoing strong consolidation of service provision – which has bearing on affordability of services, and in some instances on provision of new services. Further, concurrent to the rapid growth rate for mobile, and to some extent because of it, there has been a stagnation of fixed line roll-out.

In Latin America, fixed line teledensity hovers around 17%. Further, an issue with relying on mobile telephony for network extension is that unless you are connected to network via expensive satellite services the signal does not reach far off of the beaten track of fixed line services. Especially for rural connectivity solutions, other wireless technologies could be useful to extend access points to other users and to

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<sup>6</sup> BuddeComm (2005).

remote communities. A weak point for mobile services concerns interconnection with other networks – and long distance and roaming charges. Thus, the benefits of gaining access to the network can be limited to a particular service range.

Further, there is also the paramount issue of access to information services and content, fundamental for participation in the information society and economy. As was the case with prepaid mobile telephony, new wireless technologies have the potential to further alter economic models of telecom service provision – making them more accessible to the poor and marginalized. But because of spectrum requirements, many of the new technology applications require particular regulatory conditions, if not active regulatory support. Clearly there will be points of contradiction between creating regulatory incentives for robust network roll-out of fixed line services; and new ownership and open access models which will compete with the offering of these services.

The ICT needs of the region are diverse – falling along a spectrum of initiatives to meet the Millennium Development Goals (MDGs) to attaining enhanced e-commerce capabilities. For the former, access to the telecom network infrastructure is a good first step, but for all points on the spectrum, there is a range of new technologies with potential to meet different levels of connectivity needs.

## 2.2 OTHER NETWORK SOLUTIONS

The most prominent of new wireless technology solutions is the WiFi protocol which can be used to create a wireless local area network for users to access the Internet. Because of its range being limited to about 150 meters (at permitted power levels of transmission) WiFi has mostly been deployed in urban areas to extend access to the Internet in both commercial and community non-profit settings. However, using point-to-point antennas, there are clear advantages for deploying WiFi in rural community settings.

Worldwide Interoperability for Microwave Access (WiMax) is an emerging protocol in the same vein as WiFi – but offering a range of 35-40 kilometers, much higher bandwidth.<sup>7</sup> Millicom Argentina and Colombia Telecom have both deployed *pre*WiMAX networks.<sup>8</sup> CorDECT building on the EU's DECT<sup>9</sup> standard, and other a fixed wireless local loop solutions are being used to provide high quality voice and always on Internet. Like WiFi and WiMAX, the range of up to 35 kilometers can be extended with a repeater station. (See Mallalieu and Rocke chapter 6 for a detailed list of pro-poor ICT solutions.)

<sup>7</sup> For an overview of WiMAX spectrum requirements, see Fellah (2005) and Kahn (2003).

<sup>8</sup> The equipment used cannot be certified as WiMAX – because the standard is still being developed.

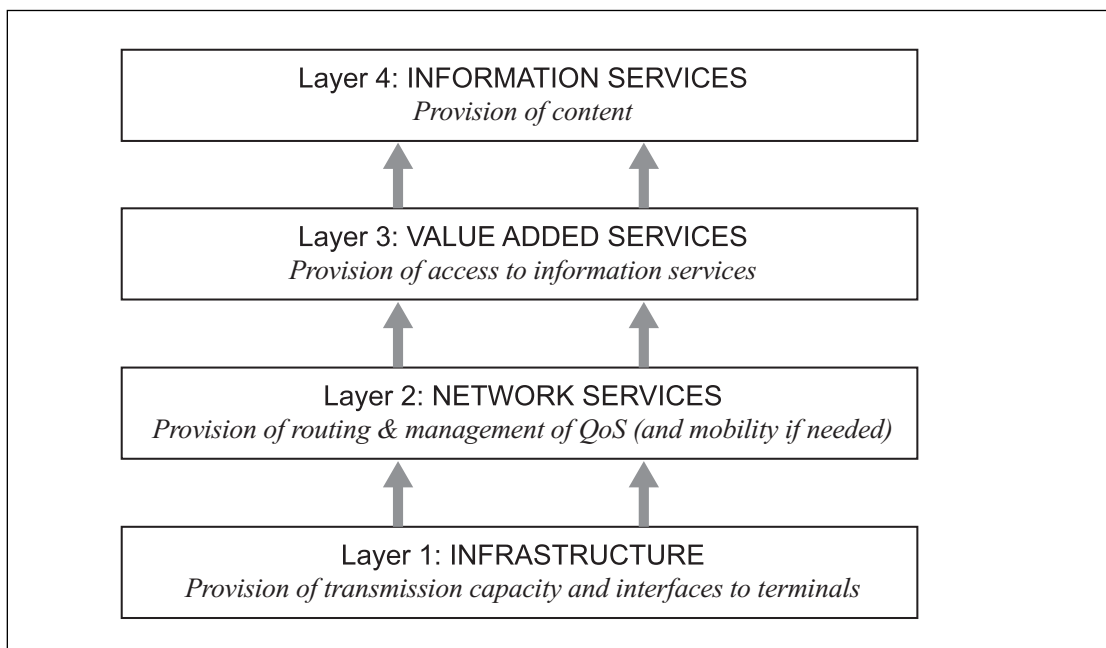
<sup>9</sup> Digital European Cordless Telephone (DECT)

There are varying restrictions on the use of the WiFi band of spectrum in terms of how and by whom the necessary spectrum can be used. Some countries offer free use up to 1 Watt, others impose relatively onerous and expensive registration requirements. For regulators (and indeed for telecom service providers) the advent of protocols such as WiFi and WiMAX blurs the distinction between traditional telephony and information services provision. With Internet access, individuals can access services and applications such as voice over IP (VoIP) because voice services are otherwise not available or because VoIP telephony is cheaper. Also, benefits of VoIP are becoming evident in terms of decreasing international revenue settlements.

Regulation of VoIP service provision is inconsistent across Latin America – with some regulators designating the service as value-added and others as a voice service. Established service providers, especially for long distance services view VoIP as cheap competition undermining revenues. Some countries in the region prohibit VoIP, others require licensing, and in others it is either deregulated or not regulated as a value-added service (see Galperin and Girard chapter 5 for a details on LA&C licensing conditions).

These three IP convergence examples (WiFi, WiMAX and VoIP) provide evidence of the unbundling of network services from network infrastructure (see Figure 1), and significantly reduce barriers to entry in services provisioning. While mobile and

Figure 1: **ICT Service Layers**



Source: Arnbak (1999).



prepaid mobile rocked the market for extending individuals' access to the network, internet protocol services drastically expand the possibilities for diversifying participation in network development. Given regulatory conditions that will allow new modes of connectivity to flourish, existing traditional operators will be challenged with assessing their business models and strategies for identifying new market segments. It is not difficult to imagine resistance to this task.

In a completely different vein of innovation, Powerline Transmission (PLT) is the use of electricity wiring (and electricity grid infrastructure) for communications and data transmission. Powerline technology has been long used by power companies for internal communication and for the monitoring of their infrastructure. PLT for more widespread use has been under research since the mid-1990s, with different versions currently on trial in some 30 countries.<sup>10</sup> The underlying components of digital powerline technology involve adapters to change the data into frequencies to be carried along the electricity current, and a modem which subsequently separates data from electricity. Thus, the network that is deployed is as ubiquitous as the location's energy provision. This has huge implications for using shared resources for extending ICT access for many remote regions where lack of telecom services is coupled with lack of power supply.

### 2.3 BALANCING REGULATORY STRATEGIES

Given the potential of emerging technologies to alter the economics of telecom provision, their deployment is bound to be contested by established telco providers, which is a particularly pernicious factor if there is opportunity for regulatory capture. On the other hand, the roll-out of fixed line services is still of paramount importance, especially for broadband, and regulators must balance requirements for attracting investment in this regard – which includes guarantees of return on investment, and hence a certain market exclusivity. Thus while there are immediate solutions which can be under taken, and indeed which are essential for meeting immediate connectivity needs, these should not preclude development of long-term more robust solutions using conventional fixed wire connectivity. Table 2 lists some trade-offs involved in different regulatory paths.

An important question here is whether IP and new wireless solutions will become sufficiently robust to supplant traditional fixed line ICT infrastructure. This has not been the case for mobile (and especially prepaid) telephony, which offers a lesser quality service and is limited in terms of future information applications. But, if the answer to the future of WiMAX in particular is promising, then this opens up

<sup>10</sup> Plugtek.com maintains a website with links to current articles and company press releases about PLT developments. <<http://www.plugtek.com/index.shtml>>

Table 2: **Benefits of Licensed and License-exempt Solutions**

Licensed Solution Advantages	License-Exempt Solution Advantages
Better quality of service	Faster rollout
Better non-line-of-sight reception at lower frequencies	Lower costs
Higher barriers for entrance	More worldwide options

Source: Intel (2005).

a new set of options for communities, beyond temporary arrangements while waiting for the real network to come. Different models of community service provision (or *microtelcos*) are discussed in the chapter by Galperin and Girard (chapter 5). They address the new range of questions and issues that are raised for regulators who are charged with respecting license conditions while simultaneously promoting universal access. As regulators allow and work with communities to adopt affordable solutions, the resulting bypass of traditional network infrastructure may create precedents, termed *unfair competition* by traditional service providers.

Regulatory logic of level playing fields for competition has resulted in a framework which continues to allow private sector actors to not serve unprofitable communities. However, overall economic health requires increased connectivity for all segments of the population. In the same vein, there is a dimension of entitlement in communication rights and access to ICT. Given information economy imperatives (e-readiness) and the advent of new technologies with their potential to alter the locus of provisioning and control of ICT services and access, the notion of flexible regulation takes on increased importance. Further, the lesson of mobile telephony deployment bridging the nexus of access and market efficiency gaps, is that with emerging technologies, inevitable changes to the service provision market are on the horizon.

### 3. Universal Access Programs and Diversifying Participation in Network Development

Based on the discussion of new technologies and their disruptive potential – both for providing new means of connectivity and in terms of the economics of traditional telecom service provision, we begin to see how different regulatory options can skew or flatten the playing field. For the foreseeable future, however, it is argued that the current arrangement of government policies and spending, and private sector investment will continue to be the main national level drivers of ICT infrastructure roll-out and modernization. Innovation and adoption of new technologies will also be led by government best practice and a healthy market. Many Latin American government-owned telecom monopolies prior to privatization were under-funded and badly managed, and the initial impetus of privatization and simultaneous introduction of competition in the mobile sector has done much to drive down prices, shorten or eliminate waiting lists and extend infrastructure.<sup>11</sup> There are still, however, communities and members of the population who have not yet benefited from privatization.

By 2006, it is estimated that only six percent of the Latin American population will have access to the Internet. Physical access, especially for difficult to reach network locations, is only one aspect of extending services. Marginalized communities that are not connected to the network and which are already isolated, will also need programs which support training for applications and general awareness raising about the new connectivity generally. In the similar vein, there must be attention to content development and availability of information and services, such as those provided by government. Increasingly there is a realization that access programs need to be built up from the community. Access through leased lines and shared community resources will be the main vehicles of growth for the region. It is at this level that access to what kinds of services can be best determined and subsequently mobilized.

Given emerging technologies, and the particularities of Latin American markets, how should universal access programs be designed and assessed? For the latter, as noted above, there are increasingly dynamic indicators which can be applied to assess both the level and effectiveness of connectivity. Likewise, design of such programs is also becoming more nuanced, taking into account the imperative of *first mile* solutions and community consultation.

However, as noted earlier, the starting point for the design of universal access

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<sup>11</sup> There are notable exceptions such as Uruguay which continues to provide world class telecom services, having to-date resisted privatization trends.

programs is accurate assessment of the regulatory and market terrain. Access gaps must be clearly identified as such. Given the project of regulation and competition, the first line of attack must weed out market inefficiency and hence focus on incentives for operators, license conditions and devices such as build-operate-transfer arrangements. In other words, the strategies must first focus on creating conditions for private sector initiatives and investment through market mechanisms.

The second line of attack then is charged with remedying true access gaps for potential users. Programs in this vein will include cooperatives and community owned projects, micro credit financing programs and rural development funds. Countries in Latin America that currently support such programs include:

- Chile, Fondo de Desarrollo de las Telecomunicaciones (government budget);
- Peru, Fondo de Inversión en Telecomunicaciones (FITEL) (1% operator levy);
- Colombia, Fondo de Comunicaciones (Compartel), (5% operator levy & government contribution);
- Guatemala, Fondo para el Desarrollo de la Telefonía (FONDETEL), (spectrum auctions);
- Dominican Republic, Fondo de Desarrollo de las Telecomunicaciones (FDT), (2% operator levy); and
- Argentina, Brazil, Bolivia, Ecuador and Nicaragua, which are also in various stages of implementing USO funds.<sup>12</sup>

The programs are as varied as their funding arrangements, reflecting different regulatory and market environments. Access programs are essential for addressing some of the network externality issues such as content creation, training and software development. However, as discussed by Galperin and Girard, many instances of access failure could be addressed by proactive regulation, permitting an organic uptake of connectivity – driven by need and desire for access to information and services, and achieved using emerging technology solutions.

Much of the above has focused on pro-poor strategies for connecting potential users to the network. But there must also be attention to consumers, especially to ensure that low profit sectors of the market are adequately served. Poor quality of service, unfair pricing, failure to maintain or continue to invest in infrastructure, and so forth are all possible in developing infrastructure situations. This is especial-

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<sup>12</sup> Intelcon (2005).

ly likely if consumers are unaware of their rights or are unclear about how to exercise them, or if the regulatory environment is weak and ineffective.

By way of example, affordability was not initially the case for mobile telephony. When pre-paid services were first offered they were intended as a niche market for the then affluent mobile phone users – and were priced accordingly. Although posing much lower levels of risk for default on payments and freeing-up the service provider from billing and collection administration, originally pre-paid was much more expensive than subscription arrangements. A less affluent, but massive market soon became apparent and the costs of prepaid mobile telephony came down, resulting in the pervasive expansion of telecom infrastructure.<sup>13</sup> But, this would not have happened outside of a competitive environment – designed to lower prices and provide incentives to affordably extend the network.

Further, where mobile telephony is the predominant network access point, then questions of quality of service become paramount, as users risk being trapped in a lower quality stand-in for fixed line access.

In a different example, it has been argued that high standards of quality of service (for example imposed at the introduction of privatization and competition) are inhibiting factors for extending service to the poor. In particular, some of the inherited standards (in many instances, a photocopy of regulation devised for developed countries) may not necessarily correspond to developing country contexts which may require low cost, small scale, alternative, community level provision. Thus, the notion of “quality diversification”<sup>14</sup> – a relaxation of some rigorous quality standards in order to be able to provide cheaper services to the poor – is presumed as a better option than no service at all. Without some oversight and recourse, it is easy to imagine classes of users being trapped in substandard service provision, even when upgrades become technologically and economically feasible.

Efforts to extend ICT networks to the poor and marginalized must be accompanied by subsequent protection and support of their rights in this regard. Dussán and Roldán Perea (chapter 4) discuss the origins of a telecom Ombudsman. They also propose a survey to be administered to regulators, consumers and telecom providers to inform future regulation – especially for disenfranchised sectors of the population who are also consumers of network services. With such information, efforts to ensure that pro-poor regulation is also forward-looking become more sound.

<sup>13</sup> However, subscription based mobile services on average are still cheaper than prepaid services for local and long distance calling.

<sup>14</sup> For a description and justification of this idea, see Baker and Trémolet (2000).

#### 4. REDIS-DIRSI – Moving into the Future

All good research concludes with directions for further investigation. Accordingly, this collection of REDIS-DIRSI research provides stellar pointers for continuing current research and new paths for future exploration. The book is organized around three general areas: indicators and assessment; consumer protection and the context of market concentration mitigating the effects of regulatory reform and privatization; and the role of new technologies and community ownership in extending service provision opportunities.

Two chapters in this volume propose new methodologies for obtaining a clearer perspective on the current status of Information Society in LA&C – with a particular focus on who is excluded from this picture. Barrantes' *digital poverty* methodology has been applied in Peru to better inform policy formulation and decision-making; and both this and the *information poverty* assessment methodology designed by Barja can be tested in different countries across the region.

Dussán and Roldán propose a survey to assess the regulatory terrain – giving voice to all stakeholders. The particular interest here is to work towards more effective intervention and protection of consumer rights. This work is informed by Mariscal's assessment of the role of the market in Latin America, and contending with the continent's current duopoly situation.

Galperin and Girard detail new ownership models and possibilities for community provision of network services. This work provides evidence of highly replicable models. The Percolator Model outline in Mallalieu and Rocke (chapter 6) will further inform community choices of appropriate technology.

The publication of this work is the first concerted effort of the REDIS-DIRSI research network. Due to financial support from the Institute of Connectivity of the Americas (ICA-IDRC – International Development Research Centre) the network anticipates moving ahead along these themes, within the rubric of the network's designated scope of activities and established research agenda (see Foreword).

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