Overcoming the three digital divides

ELI NOAM

Introduction

We find ourselves today at one of those great divides of economic history, where we can either go forward into the unknown, or go back, with a sigh of relief, to familiar territory. The new economy – dot-coms, new-style telecom entrants, new media companies, e-commerce sites etc. – has become an old-style bust. The adults are back in charge. Legacy is in. Balance sheets are in. Blue chips are in. We need not listen anymore to the purveyors of hype, about how bits play by different business rules than atoms, how the silicon economy is different from the carbon one, and how a $P/E$ ratio need not have any E that stands for earnings, as long as that e- stands instead for electronic.

Yet, it would be tragic if we let the pendulum swing too far, or use this breathing space for smug self-satisfaction rather than regrouping, retooling and re-planning. The black ships challenging the old economy may have retreated over the horizon, but they will be back. No temporary slowdown should obscure the fact that we have just gone through something very fundamental.

With Internet connectivity progressing at a dizzying rate, the focus of attention has shifted to those left behind. The short-hand word for this concern is the ‘digital divide’. Underlying virtually every discussion about this digital divide in Internet connectivity is the implicit assumption that such a divide is a bad thing, requiring us to ‘do something’. But maybe we should first pause for a moment and understand the implications of ending this divide. If we do that, we might end up changing our perspective on Internet policy in an important way: away from a focus on Internet connectivity, and towards the creation of e-commerce.

For a number of years US administrations have been talking prominently about the digital divide. However, if one looks at the US government’s own numbers, one can reach a more hopeful conclusion. With
present trends continuing, in a few years Internet connectivity will be near universal in rich countries, like electricity or television. A major reason is that the access mechanisms to the Internet will have changed and become user-friendly or user-independent. The Internet will soon be liberated from the complex gateway bottleneck of the personal computer, arguably the least friendly consumer mass product ever made. There will be many other gateways to the Internet, such as regular phones or TV sets. Therefore, for the rich world the universality of narrowband Internet connectivity will not be an issue.

It is most likely that an Internet differentiation will emerge along dimensions of quality. High-speed broadband Internet access requires an upgrade of the infrastructure — whether telecom, cable or wireless — which must be recovered through higher prices. Income, location and demand will be factors for bandwidth consumption. Broadband will therefore be the digital divide issue for wealthy countries. Yet, one cannot expect that high-speed Internet access (most likely used by consumers primarily for video applications) would command the same societal priority as the basic type of Internet service.

But the transformation in rich countries of the divide into a gentle slope does not mean that the issue will not last and persist for the poor countries of the developing world. And in an interdependent world this becomes a problem not just for the South, but also for the North, because such a gap will inevitably lead to international conflict.

In talking about the Internet for poor countries, it is easy to feel like a modern-day Marie Antoinette. Let them eat laptops. Of course the Internet is important. But is it really a priority? The answer is yes, because tomorrow's problems originate in today's actions and omissions. There is no luxury to solve other problems first. The world does not stand still and wait.

Spain and Portugal, the first European colonisers of the New World, were the world's leaders in shipping, which was the primary communications technology in the sixteenth and seventeenth centuries. They had the best vessels, navigation equipment, maps, seafaring skills and weapons. This combination catapulted the Iberian region to prosperity. And yet, by the eighteenth century, these countries had fallen behind England in industrial hardware and scientific software. They missed the next revolution, and centuries later have yet to catch up.

Today we are at the beginning of another revolution, driven by the Internet, and the question is: what is the cost of falling behind this time?
It is important to distinguish between three kinds of gap. The first gap is that of telecommunications connectivity. This gap is being closed by investment in infrastructure and by liberalising policy reform. In consequence, the telephone penetration of the developing countries has been improving. Governments have been making telecom connectivity a priority. Overcoming this gap is therefore something that engineers, investors and governments now know how to do. But progress in telecom connectivity, difficult as it may be, will prove to be the easy part.

The second type of gap is that of Internet access. In 2000, only 3% of Internet computer hosts were domiciled in non-OECD countries. Telecom and Internet are related, of course. Internet usage is much more expensive in developing countries, both relative to income and in absolute terms. For an ISP in Argentina, to lease a T-1 equivalent capacity (~1.5 Mbps) line from a phone company cost, in 1999, fifty times as much as it did in the US. Of course, progress is being made in Internet connectivity, too. For Latin America, growth exceeds 50% annually. But closing this gap, too, will prove to be, relatively speaking, an easy task. In fact, it is easier to overcome this gap than the one in telecom infrastructure. Once telephone lines exist, it is not very difficult to connect a computer or a simple Internet device to them. Specific policies to encourage Internet usage include to establish flat-rate telecom pricing on local calls; to accept widespread use of IP telephony; to create public Internet access points such as kiosks at public places, government departments or post office; and to use e-mail for some government business with citizens.

Internet connectivity does not take care of the third and critical gap, which is that of e-commerce. In fact, progress in overcoming the first and second gaps may exacerbate the third gap. Today, developing countries account for only 5% of world commercial websites and receive only 2.4% of world Internet commerce revenues. In contrast, twelve countries will account for almost 85 percent of e-commerce and eight countries will account for 80% of e-content.

To understand why this is so, let us make three observations about the global dynamics of e-transactions:

1. the price of international transmission is dropping rapidly;
2. domestic internet penetration is increasing rapidly; and
3. most e-commerce applications have strong economies of scale.

Low-cost global transmission leads to a large rise in electronic transactions with consequences for business. Of course, traditional ways of
doing business will not disappear, just as the mom-and-pop store did not vanish when supermarkets emerged. But the energy and dynamism will be in electronic modes of commerce. And here, US firms will be the most successful. They will be technologically at the leading edge, with risk capital at their disposal, with the advantage of being an early entrant and having a large home market. Once a firm establishes a successful model for the US market, invests the fixed costs, and secures nearly non-existent transmission prices, there is no reason to stop at the border.

The implications are that e-commerce will be dominated by firms from the US and other electronically advanced countries. Closing the first two gaps therefore exacerbates the third gap by creating the highways and instrumentalities for rich countries to sell in poor countries.

Of course, it is not purely a one-way street. The Internet also provides poor countries with opportunities to participate and share information. We have all heard stories about how a local craftsman in a remote village can now access the world market for his woodcarvings. True, for certain types of product marketing becomes easier. But for most mass products, the complexities of sophisticated e-commerce sites are great. These complexities are greater still for information products and services and will be even greater in a broadband internet environment where the production costs of attractive e-sites are high.

What counts is not absolute but relative cost reductions, relative advantage of e-commerce go to advanced countries. One lesson we have learned the hard way is that it is expensive to do e-commerce well. E-commerce operations are difficult. They are vastly more involved than running a website and a shopping cart. Many systems need to be in place and integrated. Some elements needed are supply chain EDI (electronic data interchange), payment systems, integration with financial institutions, fulfilment systems, customer data mining, production, customisation, community creation and the creation of consumer lock-in by additional features. Intermediaries need to be reshaped. Processes are accelerated domestically and internationally, at lightning speed, great reliability, easy scalability, and flexibility of configuration.

**What are some of the implications?**

Instead of being that frictionless competitive capitalism rhapsodised about by many people, many parts of the new economy will actually be a fortress of market power. Economies of scale are returning. On the supply side, the fixed costs of e-commerce operations tend to be high,
but the variable cost of spreading the service to the entire world is relatively low – the classic attributes of a ‘natural’ monopoly. On the demand side, there are ‘positive network externalities’ of having large user communities. Put these three things together – high fixed costs, low marginal costs and network externalities – and there are real advantages to being large.

All of this is still true for the emerging broadband Internet. The costs for consumer e-commerce sites will rise considerably. Text and still images will not be sufficient in a competitive environment and expensive video and multimedia will be required.

This low share has been disturbing. For several centuries, culture flowed largely in one direction: out of Europe, and to the colonies and the rest of the world. Then, after World War I, the flow reversed direction for the young medium of film. Around the world, audiences flocked to Hollywood movies. European cultural elites, shocked at the loss of control over their publics, led a counter-charge. They promoted protectionism to support centuries-old national cultures against a few vaudeville theatre promoters who had pitched their tents in Hollywood. But, despite seven decades of effort, this challenge remains.

And now, a new medium is knocking – television over the internet – and the question is what will enter when the door is opened. Will it be a multicultural richness of many national sources or will it be more Hollywood?

The knee-jerk response to this question is to invoke Internet platitudes. Anybody can enter, you can’t tell a dog on the Internet, a bit is a bit, silicon economics are different from carbon economics, Internet penetration is higher in Finland than in the US, etc. It is as if the Internet community, staunchly internationalist and multicultural by outlook and background, does not want to face the very question of whether it contributes to the further ascendancy of US mass culture.

For electronic media, transmission technology is destiny: it affects format, content and economics. It used to be expensive to move information; now it is cheap. We can do old things in new ways, new things in old ways, and new things in new ways.

So now we are in the midst of an historic move: from the kilobit stages of individualised communications to the megabit stage, and within the foreseeable future, to the gigabit stage. The implications of this transition are as great as the change from a horse-and-cart system and railroads to automobiles and airplanes had been in the twentieth century.
Let us analyse the relative costs of audio-visual media. Each form of delivery has its specific cost characteristics, which have implications. These calculations will be order-of-magnitude only.

**Internet TV**

The cost of Internet TV content is hard to estimate. It includes a lot of low-budget, experimental, volunteer TV programmes. There is a significant need to keep costs down, especially in the early stages. At the same time, the whole point of Internet TV is to be more than standard, linear TV. The whole point is interactivity, multimedia and new creation. The interactivity and multimedia aspects of the medium require additional features beyond straight video. And, after an initial amateur period, competition will soon be fierce for audiences, and commercial providers of Internet TV will have to offer quality content. Therefore, once broadband Internet is available to most households and once people will consider it nightly among their entertainment options, it cannot possibly be produced cheaply.

Hence, the programme cost of original content that is not merely the replay or retransmission of traditional video will be no lower than that of linear cable TV, and will more likely be higher. Distribution costs are 1.85 m¢ per second and user.¹ This is forty times higher than the distribution cost per cable channel. The reason is that individualisation requires significantly larger transmission resources. A similar disadvantage exists in another synchronous mass-audience medium, broadcast TV, where the ratio is 1:27. Hence, Internet TV can function economically only as a premium medium or a specialised medium. This defines several types of application.

The use of the Internet purely as a distribution medium

Internet TV for video-on-demand (VOD)

Delivery of films, at the very top of the distribution chain, occurs immediately after cinema distribution and maybe even ahead of it (there is probably no better way to generate a worldwide buzz for a movie than distribution of it through the Internet). It is more expensive to distribute than cable and TV, but viewers can be charged more, in a more differentiated way.

¹ Based on US $40/mo for a 1 Mbps internet channel.
Specialised programmes

Firms and specialised audiences that would not be served by synchronous TV would be amenable to specialised programmes. For example, those desiring to watch TV programmes in Hungarian, or soccer matches of their home team in Stockholm while they are vacationing in Spain, or on specialised topics would be well served by Internet TV.

Office viewing

Perhaps the most popular use of Internet TV might be by office workers who cannot watch broadcast or cable TV. The economics of all three types of such content delivery depends on the size and willingness-to-pay of such audiences. Content would often be already produced - e.g. Hungarian soccer on TV - and would reach wider audiences. Only if such audiences become a significant factor are they likely to affect the content itself and its production budget.

The use of the Internet as a storage medium: archived programmes

Old video and film become accessible by viewers as they link to servers that store them. The content costs for such programmes have already been incurred. Archive access would benefit, in particular, documentaries, because they tend to depreciate more slowly than most entertainment programmes.

Use of the Internet as an interactive medium

Interactive content supplementary to one-way distribution

Here, a two-way channel is added to a one-way broadcast programme, enabling the viewer to obtain additional information about the main programme, or, more likely, to engage in commercial transactions.

Interactivity and multimedia applications

This includes using the medium in ways that cannot be done over regular, one-way TV. This content type is the main innovative aspect of Internet TV, and should be our main focus. It enables new genres of programmes rather than merely a more flexible access to traditional programmes. It is, however, also by far the most expensive content to produce, both because it cannot fall back on existing content, and because it requires complex designs and software programming.
Furthermore, it is the major form of content that can prevail economically due to its uniqueness, against established and upgraded channels such as those of cable TV. This will be developed further now.

**Basic economics drives applications**

Our previous analysis showed that the cost advantages of cable-style distribution over Internet-style distribution are significant, by a factor of about forty. The increased efficiency and declining cost of fibre does not mean that all pipes will become individualised. This is a common mistake made by people who argue that transmission is becoming cheap. It drops just as much for cable TV distribution. The relative cost of shared (synchronous) transmission is still much lower than that of non-shared, asynchronous transmission. At best, the two will coexist, with the individualised Internet channels providing the premium offerings. At worst, Internet TV will never become competitive enough to be a mass medium and will remain a niche offering.

What the drop in cost means, however, is that the impact of distance becomes much less and that both synchronous and asynchronous networks can be designed for national and global distribution rather than for local distribution. This means that terrestrial TV loses the protection of distance, and that satellite and cable TV lose the protection of limited spectrum on licensing.

From the numbers it is quite clear that one would not want to use Internet TV for regular video content distribution. For that purpose, cable TV and its fibre digital variants will be much cheaper. Internet TV’s market is for applications that go beyond regular TV: distant, specialised, archived, interactive, asynchronous, linked, multimedia.

To produce such interactive content is expensive. It requires creativity, lots of programmers, and significant alpha and beta testing, and many new versions. It might be a bit like *Dungeons and Dragons* meets *Baywatch* meets *Survivor*. It also exhibits strong economies of scale on the content production side, and network externalities on the demand side. Both favour content providers that can come up with big budgets, diversify risk, distribute also over other multiple platforms, create product tie-ins, and establish global user communities.

Even for non-premium programme, such as creative small productions, or sex-shows and games – where the absolute production costs are lower, the economic advantages of a large user base still apply.
And these requirements will favour US companies when Internet TV emerges as a serious offering. The US has a large Internet community, significant hardware and software entrepreneurial energy barely contained by the recent economic downturn, a financial system that provides risk capital, big content-producing companies with worldwide distribution and with experience in reaching popular audiences, talent in content creativity and technology from all over the world, efficient geographic clusters in production and technology, the cultural prowess of the world’s superpower, language, a diverse culture, and a university system that generates technology and entrepreneurship. These factors are also available elsewhere, but probably nowhere else in such a combination. On the other hand, the US lacks the supportive mechanism of public TV that exists in Europe and Japan.

Thus, the medium of Internet TV combines the strengths of the US economy and society in entertainment content, Internet, and e-transactions. Add to that economies of scale, and there is nothing on the horizon that can match it. And, therefore, Internet TV will be strongly American. Participants from other countries will also be players, but most likely either domestically without much global reach, or global players who will offer basically American-style content to the world, like sitcoms and the Italian ‘spaghetti westerns’ of the past.

The Internet is a revolution, and it is a characteristic of revolutions that they create many losers – banks will be threatened by electronic global financial institutions; universities will find their students migrating to distance education; TV broadcasters will be bypassed by global Hollywood video servers; etc. Most institutions will be losing the protection of distance, and will be exposed to world markets.

It is characteristic of losers, especially if they are domestically still large and powerful, to seek protection through the political sphere. And, therefore, there will be an inevitable global political backlash against e-commerce. This is likely to take the form of restrictions, by countries on the wrong side of the e-commerce gap. And there will be a strong likelihood for international cyber-trade wars.

Centuries ago, in Spain, the powers resisting the industrial revolution and its reshaping of domestic power were the Church, the State, and agricultural economic interests. They won out, and Spain was slowed on the road to industrialisation. A similar scenario will play itself out as we enter the digital economy, and as the losers begin to organise themselves.
The main alternative to future conflicts over cyber-trade and the best remedy for the gap in e-commerce is for developing countries to create progress in e-commerce that makes the electronic highways into two-way routes. But what can a developing country do, concretely? This is much more difficult than catching up with telecom densities, because it is a question of general societal modernisation, not just of an infrastructure construction programme.

There is no single strategy, no silver bullet. But here are several suggested elements.

1. Telecom policy of entry and investment based on market forces and competition.
2. Use the government as the lead user, to help create domestic critical mass and experts. The US military had been successful in getting the Internet started initially. Government operations such as procurement should move to the web. This would create transparency, reduce procurement costs, and force domestic suppliers to move to electronic marketing. Governments could also provide some services electronically, such as the filing of forms and applications, or information on subjects such as health, education, taxes and agriculture.
3. Be prepared to ignore domestic consumer markets. It takes too much time to develop them. The focus should instead be on the global market, mostly business-to-business. The domestic consumer market is relatively small, but the global internet market is huge and open. The creation of free trade zones for e-commerce is one concrete step in that direction.
4. Develop niche markets. Leverage cultural proximity. Examples could include:
   - regional hub: Tunisia for North Africa;
   - language: Brazil for Portuguese speakers;
   - religion: Saudi Arabia for Moslems; and
   - economics: Bahrain for the oil industry.
5. Reform the legal system to make e-transactions possible. The recognition of digital signatures is an example. Adapt commercial codes to online environments and update rules applying to liability, contract, privacy and security issues. Examples include the UNCITRAL Model Law (1996), and the ITU EC-DC project. It is also essential to combat...
the fraud, illegal operations and piracy that undercut the emergence of a domestic industry.

6. Strengthen the physical delivery infrastructure and investments in it. One cannot sell abroad if one cannot ship quickly. This is one of the secrets of Singapore’s success. This includes the physical delivery infrastructure of harbours, airports and export facilities.

7. Strengthen the investment climate. Provide tax incentives for e-commerce and e-exports, offer low international telecom rates, support micro-credit institutions, encourage local entrepreneurship and cooperatives, and support the venture capital industry and incubators.

8. Support technological education. Investments are important, but not as important as IT skills and a new economy mindset. There are 3.8 R&D scientists and technicians per 1,000 people in developed countries and only 0.4% per 1,000 in developing countries.

9. Create wealth incentives. Permit e-commerce entrepreneurs to become rich through the Internet, thereby fuelling the emergence of local start-ups.

10. Encourage foreign investments.

11. Provide back-office functions to major e-commerce sites as a way to establish experience. India and Jamaica are examples.

Most well-informed people understand the importance of e-commerce. But they often do not have a sense of urgency. Right now, the foundations are being laid for a great new economic system and for a new generation of business empires. Even if less developed countries cannot be expected to be among the leaders, there are enough emerging countries and striving firms that could be suppliers and not only buyers. India, for example, may be a poor country by most measures, yet it could become an e-commerce participant beyond its growing Internet technology role.

Success in e-commerce means participation in modernisation, but also participation in the disruptions brought about by modernisation. The Internet will lead to less stability, more fragmentation and less consensus. But the alternative is much less palatable. Failure to participate in global e-commerce means fundamental long-term economic stagnation.

Different countries are affected differently, depending on, among other things, their economic mix. The US had a troubled industrial sector, and the new economy was one way to resume growth. US society is also capable of change, being perhaps strongest in situations of accelerating change – ‘second derivative’ situations. In contrast, Europe and Japan had stronger
old economies, and are stronger in managing steady growth – ‘first derivative’ economies. And less developed countries had, for a multitude of reasons, the greatest difficulties in changing to new economy activities, primarily because these require substantial societal modernisation and infrastructure investments.

This is then the challenge to developing countries. To get moving, to move beyond the first gap, that of telecommunications, by overcoming the traditional policy squabbles about the rights of entrants and the privileges of incumbents – issues that will seem in a few years quite trivial – and to close the second gap, that of the Internet. They should also deal aggressively with the closing of the e-commerce gap, because it is the real, critical and fundamental threat – as well as a major opportunity – to them and a way to improve economic relations around the world.