

Benefiting from Convergence: Access, Mobility and Ubiquity

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The views expressed in this paper are those of the author, and do not necessarily represent the views of Industry Canada or the Government of Canada.

Introduction

Convergence has many definitions, referring in various ways and combinations to the blending of previously distinct technologies, networks, services and traditional industries into new combined forms. The onset of ‘convergence’ between telecommunications and broadcasting has been discussed for over two decades but with little evidence that indeed cross-over has been occurring. The signs are that it is now finally appearing, and becoming a defining characteristic of the Internet economy, because of *the emergence and growing dominance of full IP networks and the neutrality of technology to the type of signal or content transmitted.*^{i,ii}

Without IP networks, services were tied to a specific infrastructure. In the ‘old’ days, telephony was circuit switched voice calls over telecom infrastructure; television was over-the-air satellite or cable broadcasting with a one way, one to many technology. Internet data was able to be sent over either telephony or broadcast infrastructures with specific overlay technologies to allow packet delivery. However, infrastructures were still largely tied to specific services and these services tied to specific technologies.ⁱⁱⁱ

IP technology as used in what are called NGN’s - Next generation Networks- has all services – be they voice, data, and video, sent as a series of packets, in the same manner over the NGN. As a result all NGN networks can deliver a wide breadth of services – telephony and television as well as new services which are just emerging. Much of the rapid growth in traffic is user – generated content (Web 2.0) a phenomenon discussed below which has important implications for both network design and for public policy.^{iv}

Interest in these IP - NGN networks is advancing, and to maximise investment and innovation, society must be clear in the policies that govern their use. Today’s regulatory structures are a legacy of a century of separation of specific communications services. These regulatory processes were designed for two purposes – first, to foster competition as former monopolies were dragged into competitive regimes and second to impose public policy objectives such as universal service and diversity of broadcasting. Full IP-NGN networks – core and access-have large bandwidth capacities, and do not separate services. Hence, legacy regulatory processes and public policy objectives are being re-examined in most nations. With new structures and new emerging issues, other policy issues, such as ‘net neutrality’ are emerging. We can say with certainty that even more issues will emerge for policy makers to deal with, as NGN’s evolve.

Societies must however take care now to ensure that existing legacy regulation is ‘fit for purpose’ and does not stand in the way of new investments in NGN and of innovative uses of NGN networks. Continuing to impose legacy regulation may well hamper investment, innovation and use.^v

In the post war period, nations imposed broadly similar restrictions^{vi} in telecoms and broadcasting. So there was, in a broad sense, ‘convergence’ in policy. Certainly some nations moved to liberalise entry in telecommunications markets earlier than other. But a policy consensus at least developed in the developed world on the paths to be followed. Liberalisation in broadcasting moved in somewhat separate ways. However, today we see quite different policy paths being taken; hence continuing stock taking by the OECD of these differences and their likely global impact is valuable.^{vii}

In moving to this brave new IP-NGN world and focussing on the actions required to ensure timely investment in the internet economy, both to enlarge network capacity and functionality and to accelerate convergence, some key issues to be addressed are as follows:^{viii}

Issues for Public Policy

- a) policies to promote new investment
- b) the future of unbundling and other 'legacy' regulation from the non-IP world ^{ix}
- c) spectrum policy
- d) technological neutrality
- e) net neutrality
- f) access and Universality

Implications for the OECD

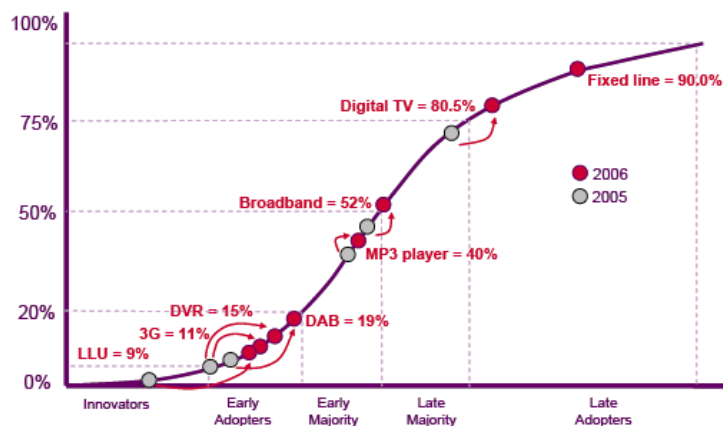
There are basic core divergences in core regulation globally, and there are basic core divergences in policies affecting convergence globally. Hence, the need for the OECD to continue and expand its policy and regulatory analyses is greater than ever. Some suggestions for new roles for the OECD are given below.

The Take-Up of Convergence

I use data produced in August 2007 in Ofcom's 2007 Review to show the extent of 'Convergence.' Figure 1.2 shows the take-up of digital communications technologies in the UK, a short-hand view of the potential for convergence in the near term (say 3-5 years) as full IP networks take hold.

Figure 1.2 Digital communications technologies take-up, 2005 and 2006

Proportion of individuals (%)



Source: Ofcom research and operator data

Notes: All figures relate to the end of Q1 2007 except for 3G which is end of 2006. All figures are measured as a proportion of individuals except for 3G, which represents the proportion of mobile subscribers, LLU which represents the proportion of premises in unbundled areas and DTV, which represents the proportion of homes with a digital television reception device on the main set.

It does appear that the advent of convergence is upon us. However, there is, in my view, insufficient analysis of the full implications of convergence and the emergence of user generated content. OFCOM in its recent August 23, 2007 Review showed that fully 56% of UK internet traffic is now peer-to-peer and that this growth is attributed to the emergence of "new media" content, such as Facebook, YouTube etc.

The implications of these new phenomena are the required communications network capacities in the near future. If we add the bandwidth of emerging IPTV technologies and HDTV requirements – it is easy to show the need for a minimum of 50 MB of download and symmetric

needs for uploads.^x Many feel that the bandwidth demands in the medium term future will be multiples of this. Hence incentives for investment and innovation are paramount.

Key Regulatory Issues

a) Challenges for future Investment

We are all convinced that Broadband Matters^{xi}, but less convinced on the policy paths to ensure such new investments and the impact of legacy regulation on investment in IP-NGN networks.

Table 1, in the Appendix, provides summary data for three recent empirical analyses of the impacts of regulation on investment.

These studies have somewhat different results. The ones by Wallsten and by Crandall and Singer show that loop unbundling negatively affects broadband rollout. The analysis by DiStaso et al shows that inter-platform competition expands broadband take-up as does low LLU prices.

A newly completed study by Waverman, Meschi, Reillier and Dasgupta^{xii} examines the relationship between one measure of current European regulation – the price of an unbundled loop and the extent of competitive infrastructure i.e. cable.

This study demonstrates that while lowering LLU prices stimulates competition and broadband penetration in the short term, it also significantly reduces the level of inter-platform competition in the longer term. The authors find that the share of alternative access technologies is very sensitive to the price of unbundled local loops, even after the authors control for other factors that affect the share of alternative technologies such as the cost of deploying access networks.

The fall in subscriber levels for alternative infrastructure has the impact of reducing investment in alternative access platforms in both the short-term and the long-term. In the short-term, investment associated with connecting customers and upgrading networks is foregone, while in the longer term, the very substantial investment associated with expanding network footprints is also jeopardised.

These four studies provide some evidence, not universal, that specific aspects of legacy regulation can negatively impact investment. More work is needed.

Hence, an important role for the OECD would be to assist in determining the impacts of regulation on investment, and network rollout. Initially, the OECD can host a meeting of academics and consultants who have analysed empirically the impact of regulation on investment. This meeting could be used to determine whether differences in results are due to differences in data, methodology etc.

b) The Future of Legacy Regulation

i) Telecoms

Because of the perceived lack of competition in narrowband and broadband access, most governments applied local loop unbundling (LLU), other wholesale requirements, as well as retail restriction on incumbent Telco's in the 1990's. Today most governments are removing retail restrictions but regulatory wholesale obligations differ. Several countries have lifted LLU obligations (USA, Hong Kong) and others are contemplating such changes (Canada). In other

parts of the world (Europe) there remains a deep seated belief in the continued need for LLU on today's telecom providers as well as view of the need to extend LLU and even further regulatory obligations.^{xiii}

These policy differences represent deep divergent views on the ability of competition between two different platforms to deliver competitive benefits to consumers and society. The European view expressed in a recent analysis by three academic economists for the EU Commission is that 'two is not enough'- two networks are likely to jointly dominate and collude.^{xiv} This concept of joint dominance also characterised EU/USA differences in analysing the GE-Honeywell proposed merger of 2000.^{xv} This view is not shared by many economists in North America.

Figure 3 shows the growth in the number of subscribers to FTTX (fibre to the street, cabinet etc,) between 2004 and 2006 in Europe, the USA, Japan and Korea. Such investment has boomed in the USA since the repeal of LLU in 2005.^{xvi} Yet, Japan has an aggressive LLU policy; and high investment in IP-NGN and access networks. Korea leads in FTTX subscribers, and the role of core public policy is important in explaining this growth. Europe clearly lags however in investment in FTTX.

But we are at the beginning of IP-NGN investment not the end! Given the bandwidth requirements discussed earlier, it is investment incentives and the potential for "unintended consequences" of legacy regulation which need the closest examination.

Hence, the OECD's role as a neutral arena to analyse the implications of public and regulatory policy is critical.

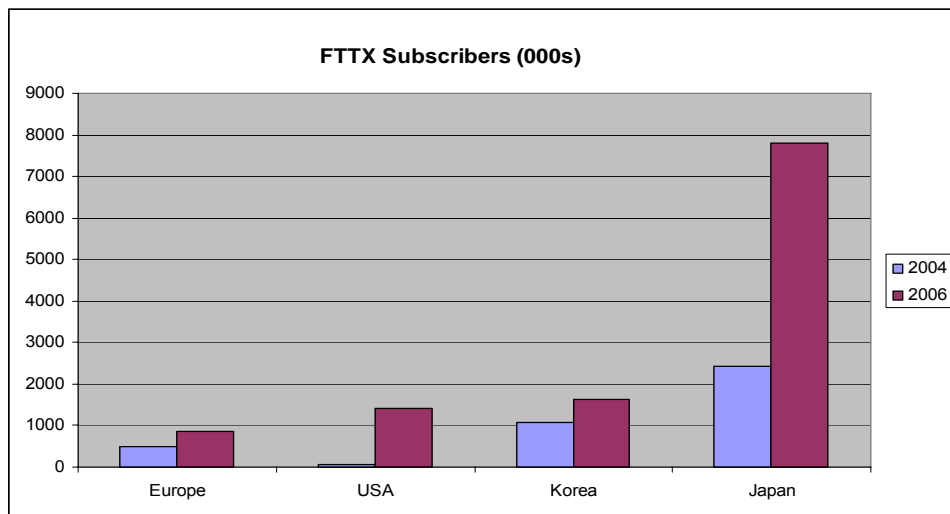


Figure 3 Source IDATE

ii) Broadcasting

A crucial question is whether there are continued public policy needs for the plethora of regulations which today govern the broadcasting sector. As noted, convergence leads to several conclusions. First, the spectrum 'scarcity' which allows governments to appropriate some of the rents in broadcasting is disappearing. Second, there are many, many routes that content can take to viewers. Third, there is now a great diversity of content.

How broadcasting regulation reflects these changes is being carefully analysed by governments. Again we see substantial differences in approaches and outcomes. Two examples are Canada and Europe. In Canada, in an on-going present review of broadcasting regulation, the CRTC states: ^{xvii}

‘The considerations described above would lead to the conclusion that it is time to move away from the current detailed regulation, and to take a revitalized approach to both distribution and discretionary programming undertakings that aims at reducing regulation to the minimum essential to achieve the objectives of the Act, relying instead on market forces wherever possible.’

In Europe, a recent review of the 1989 ‘Television without Frontiers Directive’ extends regulation to Video-on-Demand, ^{xviii} (while liberalising limits on advertising and product placement). Little mention of the role of market forces is made.

IP-NGN networks make broadcasting even more global, hence the need to rationalise public policy to deliver tomorrow’s social objectives not the objectives of the past.

c) Spectrum Policy

Spectrum policy is most important as spectrum can be a significant constraint impeding investment and innovation. Spectrum policy has two broad objectives. The first is to enable the appropriate level of services to be offered to customers, the second is to ensure global roaming where required. A number of countries are moving to market-based spectrum regimes where auctions and trading allow any particular spectrum to be used by the provider who values it most. Many countries feel that such market mechanisms have many advantages over command and control systems.

Yet questions remain: how far markets should be allowed to manage the convergence between telecoms and broadcasting? And how much co-ordination is required world-wide to ensure both roaming and global service provision? Again, the OECD can play an important role here.

d) Technological neutrality

Past regulation was designed to be technology specific. However, in moving to IP-NGN infrastructure, services such as voice calls or television signals are simply applications using bandwidth on the same infrastructure.

Most regulators today, state that they need to be technology neutral. A challenge for governments however is to consider deeply what technological neutrality means. Not all implications of technological neutrality have been sufficiently identified. For example, legacy regulation imposing wholesale obligations on one competing infrastructure sets the wholesale price for all infrastructures. Is this ‘non-neutrality consistent with broader public policy objectives? Looking forward, how does service specific regulation e.g. on IPTV or on mobile TV, to choose two emerging services, feed into the design, utilisation and hence investment in alternative infrastructure and services?

Thus we have a set of questions which need further analysis – does true technological neutrality require truly converged regulation i.e. symmetric regulation of services, no matter their platform. And if so, is this indeed where society wants to go?

e) Net Neutrality

What is the appropriate balance between the interests between network owners and operators, applications providers, end users and consumers in terms of sharing the costs of building

universal, high capacity networks? This is the basic issue called ‘net neutrality’. The concept has two principal components – pricing and the appropriate role of *ex ante* regulation.

One must remember that the pricing structure in telecoms markets is a legacy as well, and itself over 100 years old. In North America, local calls are free – a product of the turn of the century business model of the Bell system which used its monopoly over long distance lines to squeeze out local exchange competitors by offering ‘free’ local calls. ‘Calling party pays’ principles also go back to the days of Alexander Graham Bell!

Should these century old pricing rules govern Web 2.0 and IP-NGN networks? How should the costs of the new network infrastructure be garnered- from end users as in the past, or as well from content, search and service providers? Many are also concerned by the potential market power that one of only a few infrastructure facility providers could wield when network pricing, vertical integration into content as well as into other services could be tools of unfair competition.

Most suggest therefore a competition policy principle of ‘non-discrimination. Some suggest that the principles of ‘non-discrimination’ should apply in particular ways. Infrastructure owners, some argue, should not be allowed to charge differentially for traffic or to own content themselves

Alfred Kahn,^{xix} one of the most respected academics in regulatory economics has written this brief comment:

‘Much of the advocacy of legislatively-mandated network neutrality is based on a simple fallacy—namely, that differing charges to suppliers of content to the Internet for correspondingly differing speeds of delivery are inherently discriminatory. They are not; and an attempt to prohibit them would prevent the Internet’s offering a full range of services, with widely diverging tolerances for latency. Preservation of the open end-to-end character of the Internet may well, however, require vigilant prohibition of vertical squeezes and other unfair methods of competition and authority of an antitrust agency to compel interconnections.’

Net neutrality has arisen as an important policy debate first in the USA, and it will resonate across many countries. There are also beginnings of calls to impose what is called non-discriminatory requirements on wireless networks as well.^{xx}

The respective roles of *ex ante* regulation versus *ex post* competition law need to be clearly set out. Again the neutral venue of the OECD can enhance analysis. Not all countries will need to or will go along the same path. But the potential impacts of various regulatory regimes need to be fully understood *before* they are put in place. We all agree that it is crucial to have an open and competitive network environment that promotes investment in network infrastructure and modernisation and that encourages innovation and growth in the downstream Internet market place.

f) Access and Universality

Universal service obligations were imposed on telecoms and broadcasting providers, decades ago. Convergence suggests we undertake a careful re-analysis of the true social needs for such obligations in a world of diversity of competition. There will be calls to impose further universal service obligations – bringing high bandwidth to rural areas and to the disadvantaged, and to others. The goals of such universality are clearly laudable. However the path for regulatory policy is fraught with problems. First, the market place and self provision (co-operatives etc.) have rolled out broadband very quickly. One must then take care not to subsidise what would take place naturally. Second, we have learnt, I hope, from the past –

regulation acts as an entry barrier, creates winners and losers and is difficult to end. The OECD is providing guidance in this area as well. ^{xxi}

The use of converged IP networks for Business-to-Business and intra- firm use is of great importance as a driver of productivity. The AT&T/Economist Intelligence Unit paper cited earlier states that the key constraint on effective implication of IP convergence is the lack of in-house skills. Access to skills, education and training is a vital universality goal.

The Role of Key Actors and of the OECD

This is a difficult time for all actors- governments, regulators, businesses facing policy change in a converged communications world.

A key question is the appropriate balance between *ex ante* rules and *ex post* competition policy remedies. Getting this right will prove crucial. ^{xxii}

It is clear from the above rendition that significant policy differences exist between nations in the ways in which they intend to regulate new IP-NGN core and access networks. Nor is there evidence of a consistent policy paradigm emerging.

This is significant as services and providers will be more global than in the past. The 'old' communications world separated services and countries. It was just over a decade ago that international settlement rates on voice calls was a major policy issue. Now with IP-NGN networks arriving, country borders disappear as applications such as voice calls are conveyed as bits undistinguishable (we hope) from other bits. Thus great diversity in core regulation could act as barriers to the emergence of global end-to-end infrastructure providers and service providers.

It is then an opportune time for the OECD to continue its key role and to examine the implications of regulatory diversity on a forward looking basis.

Appendix

Table 1:
Empirical Studies of the Impact of Regulation on Investment

	Wallsten (2006)	Crandall and Singer (2004)	DiStaso, Lupi, Manenti (2006)
Dependent Variable	Broadband subscribers per capita, broadband download speeds	Log ratio of entrants' facilities based-lines to unbundled lines	BB Penetration measured as BB lines as share of total access lines
Principal Explanatory Variables	Vector of co-location and unbundling-related dummy variables; severity of unbundling and co-location measures varies.	Unbundled loop rate less "embedded loop costs."	Inter and Intra-Platform competition indices; dummy variables for "rights-of-way", LLU charges, fixed-line local charges.
Sample	30 OECD countries over five years from 1999 to 2003. Panel data regression with country and year fixed effects.	50 states of the USA, data for 2000 and 2001; pooled cross-sectional regression.	Quarterly observations on European union countries from 2000 to 2004; panel dataset, tried Fixed-effects, random-effects and IV models.
Data sources	OECD (2004) is primary source of unbundling data for members Also uses ITU data for download speeds and penetration rate	FCC data on embedded costs Data on CLEC (entrant) lines also from FCC reports. One set of regressions with data from "E911 Database."	Telecom Markets; The Cross-Country Analysis; Annual Implementation Reports of the European Commission
Results	Sub-loop unbundling: Negative Relationship LLU, Facilities-based competition: Positive Relationship Mandated Bitstream access: No effect	"The growth rate of Facilities-Based lines is faster relative to the growth rate of UNEs in states where UNE costs are relatively high compared to embedded loop costs."	Greater intra-platform competition is significant and positively correlated with BB penetration; but LLU prices are negatively correlated with BB—i.e., low LLU prices are better.

Notes

ⁱ Convergence began to be discussed at least in the USA in the 1960's see Roger Noll and Monroe Price, 'Communications Policy in the era of choice and convergence with reflections on the Markel Foundation'

ⁱⁱ There are, however two other types of convergence of importance besides the telecoms/broadcasting interface where much of today's discussion rests. The first is Fixed/Mobile convergence where both networks are fully IP enabled. With the growth of a full range of wireless technologies and dual use devices which can be at a 'fixed' location or mobile, the distinction between fixed and mobile services and hence market definitions will alter. (See OECD FIXED-MOBILE CONVERGENCE: MARKET DEVELOPMENTS AND POLICY ISSUES, 23 March 2007.) The second is convergence which is taking place within the enterprise due to the use of full IP networks. The implication of this convergence is not often discussed but is important as it is driving the productivity of firms and the emergence of new products and services. (See Convergence Takes Hold In The Enterprise, An AT&T survey and white paper in co-operation with the Economist Intelligence Unit, 2007)

ⁱⁱⁱ A similar definition of convergence has been defined in a paper for the OECD as follows:
'This series of developments has been termed "horizontalization", where existing networks merge into one horizontal layer that forms the converged basis for data transmission. Equal competition between different networks becomes possible. Horizontalization implies that content is uncoupled from its physical carrier, that devices are uncoupled from their networks and that the consumption of content is no longer limited to 'its own' device. This results in a market where many or all services can be received over every network and every device, a multiplatform environment. IP creates a market for content distribution in which content can be transmitted and received anytime, any place, any how. DSTI/ICCP/TISP(2006)3/FINAL p 8

^{iv} And in the other two excellent background papers to this Round table.

^v See Alfred Kahn, Network Neutrality* AEI- Brookings Joint Centre, March 2007
'The question is no longer whether to deregulate telecommunications—at least not whether to discontinue regulating it in the traditional manner and for the traditional reasons. The industry is obviously no longer a natural monopoly and wherever there is effective competition typically and most powerfully, between competing platforms—land-line telephony, cable and wireless—regulation of the historical variety is both unnecessary and likely to be anticompetitive. In particular, it is likely to discourage the heavy investment in the development and competitive offering of new platforms, and in increasing the capacity of the Internet to handle the likely astronomical increase in demands on it for such uses as on-line medical monitoring and diagnosis, video transcription and gaming.'

^{vi} By broadly similar I mean restricting entry and having broadly similar social goals.

^{vii} Canada has been a significant supporter of this work at the OECD.

^{viii} The OECD has characterised the potential social objectives from convergence as follows:

'Economic objectives:

- Promote and sustain competition and choice as a means of minimising price and maximising quality of communications services.
- Encourage investment and innovation.
- Maximise the contribution of the communication sector to economic growth and Performance

Performance

- Efficient allocation of existing spectrum.

Social and cultural objectives:

- Affordable access to a universal service specified in terms of telephony, broadcasting and internet access.
- Plurality of voices in the media.
- Cultural diversity and national identity reflected in content.

• Consumer protection and privacy'
DSTI/ICCP/TISP(2006)3/FINAL p 16

^{ix} A recent OECD Meeting stated that key policy issues were:
'While business models are in flux and as previously distinct industries such as broadcasting and traditional telecommunications converge on the Internet, are there criteria that can help guide policy makers and researchers?

How can we ensure there is sufficient investment to meet the network capacity demands of new applications and of an expanding base of users?

<http://www.oecd.org/sti/ict/futureinternet2007>)

^x SEE RTA Renders and Associates, 2007

^{xi} See COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS
Bridging the Broadband Gap, March 20, 2006

^{xii} Access Regulation and Infrastructure investment in the Telecommunications Sector, funded by ETNO, Sept 2007.

^{xiii} The EU Directorate General for The Information Society and Media is pushing to add functional separation to the arsenal of national regulators.

^{xiv} See 'A Review of certain markets included in the Commission's Recommendation on Relevant Markets subject to *ex ante* Regulation Martin Cave, Ulrich Stumpf, Tommaso Valletti July 2006

^{xv} See http://money.cnn.com/2001/07/03/europe/ge_eu/

^{xvi} See: AEI-Brookings Joint Center Policy Matters 07-20
Telecom Time Warp. Robert W. Crandall, Hal J. Singer. July 2007. '*There are three survivors of the break-up of AT&T's fixed-wire business, each of which offers phone and high-speed Internet service and is spending billions of dollars upgrading its network to offer video services. Cable television companies have also upgraded their networks so they can offer these services. And the five largest wireless carriers -- AT&T, Verizon, Sprint, T-Mobile and Alltel -- are also spending heavily so that they can offer high-speed Internet connectivity.*'

^{xvii} Broadcasting Notice of Public Hearing CRTC 2007-10
Ottawa, 5 July 2007, Para 12.

^{xviii} DIRECTIVE [] OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL AMENDING COUNCIL DIRECTIVE 89/552/EEC

^{xix} Ibid

^{xx} See: The Economics of "Wireless Net Neutrality", Robert W. Hahn, Robert E. Litan, Hal J. Singer ,Related Publication 07-10, April 2007 AEI-Brookings Joint Centre

^{xxi} http://www.oecd.org/LongAbstract/0,3425,en_2649_33703_36503874_1_1_1_1,00.html

^{xxii} The evolving Canadian policy regime is commendable in its' openness to change, its belief in market forces, where practicable and the minimization of *ex- ante* regulation.