

Notes on Reforming the Federal Communications Commission

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Pierre de Vries
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Summary

The industries that the FCC was created to regulate are morphing into a substantially more complex configuration. We have moved from the industrial age of traditional telecoms and broadcasting to a knowledge-based economy. The FCC needs to find new ways to discharge its mandates.

Experience from complex systems theory suggests the following regulatory techniques:

- Regulate through guiding principles rather than prescriptive rules
- Add computer modeling and simulation to the repertoire of safe-to-fail experiments done before making regulatory choices
- Delegate responsibility through the increased use of supervised self-regulation (also known as "co-regulation")
- Improve agility and responsiveness through requirements on transparency and intelligibility
- Build a basis for decisions through improved data gathering and interpretation

These techniques will only bear fruit in a suitable institutional setting. The FCC should build on its existing expertise through a focus on learning and planning; depend more on its own resources to inform decisions, rather than on the submissions of interested parties; and strengthen institutional memory by planning the career arcs of professional staff, both experienced and new.

All this will require changes in the institution's organization. The Commission should be reorganized by replacing industry-oriented bureaus by departments based on policy mandates:

1. Public Safety: Access to emergency services, law enforcement surveillance, data retention, and child safety.
2. Consumer Protection: Privacy, fraud, fair trade terms, access for those with disabilities, device certification, universal service, digital inclusion.
3. Culture & Values: Control of speech (obscenity, violence in media), advertising rules, state support for media production.
4. Markets: Allocation of resources (numbers, spectrum), market analysis, competition.

Offices that provide cross-organization services, such as OET and OSP, should be retained, since they can moderate conflict and reduce duplication.

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1 Introduction

Calls for reforming the FCC have been growing louder for some time. It is therefore instructive to examine why it has ended up in this situation. Some of the problems are due to the personalities and politics of the moment, and are thus transitory. Some are due to its terms of operation; the FCC's structure and mission are determined by the Communications Act, and won't change fundamentally unless the Act changes. The deeper cause is a change in the nature what is being regulated: the transformation of the communications business from telecoms and broadcasting to the internet.

Since the mid-90s, the computer, information and communication services have come to dwarf telecommunications services. For example, Figure 2 charts the service exports of the OECD countries; note the explosive growth of computer and information services relative to telecommunications services starting in the mid-1990s.

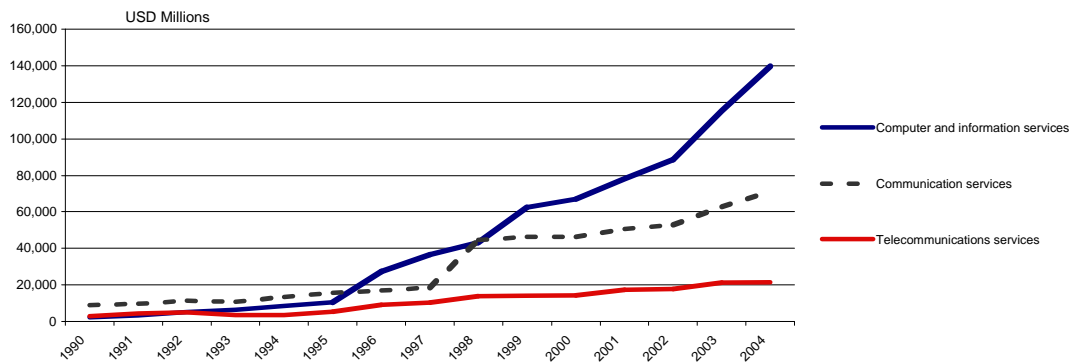


Figure 1: Service exports of the OECD countries, USD millions

Source: [OECD Communications Outlook 2007](#), p. 256; data [here](#).

Computing has brought a qualitative as well as a quantitative change. The internet/web is much more modular, decentralized, self-organizing, adaptive and diverse than telecommunications and broadcasting. These are all characteristics that distinguish complex systems from merely complicated ones.

An analogy may help: the FCC in the telecoms era was like a farmer managing agricultural production; today it is like a ranger responsible for a wilderness. A farmer can decide which crops to cultivate, where to plant what, and when to rotate – though the plants do the work of converting sunlight to carbohydrates, and livestock convert plants to meat. Some inputs, like weather and market conditions, are unpredictable, but many – irrigation, fertilizer, seed type, antibiotics – are under the farmer's control. Weather and market risk is mitigated by massive government subsidies for major crops. The desired output is well-defined and easily measurable. Park managers, on the other hand, have to deal with a very different balance of power and responsibility. They have to protect endangered species, prevent catastrophic fires, and provide access to citizens, but have little or no control over the animals and plants in the ecosystem, or the inputs in the form of weather, migrating animals, or pests.

The limited control one has over complex adaptive system means that detailed, rule-based regulation is no longer effective. An approach based on principles, supported by tools such as transparency and computer simulation, is required. Rules can determine which crop hybrid to use for a particular market need given climate and soil type; but principles – such as flexibility, taking a big picture view, fostering diversity, and delegating responsibility – are unavoidable when shaping an ecosystem.

References and suggestions for further reading can be found at the end in Section 8.

2 Root Causes and Conceptual Tools

As an exercise, consider whether the following attributes apply to 21st century communications (which I'll also refer to as ICT, for lack of a better term): the absence of a global controller; nested, hierarchical organization; dispersed interactions; never-ending novelty; constant selection among candidate solutions; and rapid adaptation to new circumstances. They clearly apply, and they are clearly less applicable to the silo world of telecommunications and analog broadcasting of only a few decades ago.

These attributes are the hallmarks of complexity and adaptive, non-linear systems. 21st Century communication is a complex adaptive social system, but the FCC was set up to manage a 20th century industry which was complicated but not complex. This is the deep reason why the institution needs to change.

2.1 *The adaptive cycle*

Complex systems cycle through distinct stages. The study of ecosystems led to the enumeration of the so-called adaptive cycle. I will describe it briefly, and then apply it to ICT.

During the exploitation or growth stage, there is rapid colonization of recently disturbed areas, for example after a fire or wind storm has removed large amounts of biomass in a forest. The connectedness between organisms is low, which leads to high resilience; the loss of one species doesn't lead to the loss of another. As the forest matures, it moves into the mature conservation phase of the cycle, which is dominated by the accumulation of material. The network of connections between biomass and nutrients becomes increasingly tight, and fragile; every niche in the forest is filled, and every resource is used. Organisms become much more interdependent; food chains become dense and interconnected. The conservation phase is followed by a dramatic release, triggered in a forest by fire, drought, insect pests, etc. A lot of energy is unbound, and networks are broken up. This sets the scene for the fourth phase, reorganization: opportunistic species that have been suppressed by the stable configuration of the conservation phase move in. This is a time of innovation and restructuring, laying the groundwork for a return to another growth phase during which exploitation takes place.

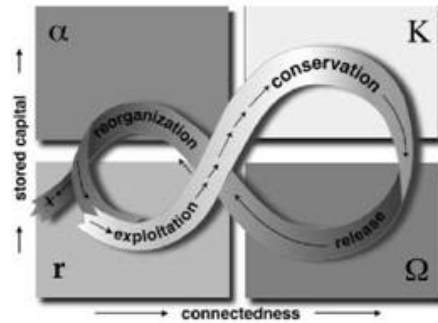


Figure 2: The Adaptive Cycle

Taken from the Macaulay Institute [web site](#); based on Gunderson & Holling (2002) p. 43, Fig 2-1. The longer the arrow, the faster the process. The abbreviations α , K , r and Ω are conventional symbols used in population modeling.

The adaptive cycle alternates periods of gradual accumulation of potential (e.g. biomass, socio-economic capital, or know-how) with sudden and often unexpected disruptions that reorganize that potential. Stored capital and connectedness peaks at maturity, the end of the conservation phase, but that is also the time when resilience to shocks is at its lowest because disruptions spread rapidly to all members of the system; nobody is spared, because everybody is connected. This cycle of aggregation followed by restructuring leads to innovation; but the release phase is often a surprise, and frequently an unpleasant one for those who were successful in the conservation phase. It is thus often experienced as a crisis.

2.2 Decision Environments

One can recognize the phases of the adaptive cycle in the internet/web, and in the larger system of communications governance. It is helpful to parse the system into four decision environments that represent different hierarchical layers, each with its own adaptive cycle:

- Political system: local, state and federal politicians seeking to advance their own agendas. The political system went through a release phase with the 2008 election, and will spend 2009 in reorganization as players who have been out of office for eight years move into newly opened positions of power (cf. ecological niches), bringing new perspectives with them.
- Inter-organizational system: peer agencies with partially overlapping responsibilities, such as the FCC, FTC and NTIA. The new Administration will necessarily bring changes at the top of the FTC and NTIA, but the consequences may not be as dramatic as those at the FCC, providing some stability at this layer.
- Organizational system: an agency, in this analysis the FCC, acting on its “subject” layer of market/culture, and interacting with other organizations, in a context provided by the political systems. The FCC is due for “release” with the appointment of new Commissioners and a new Chairman in 2009. Large-scale departures of long-serving career staff in recent years represent a release of built-up intellectual capital, with the breakup of long-standing networks of expertise and the dissipation of institutional knowledge.
- Market/culture: companies and citizen/consumers using technology (goods and services) to achieve their various ends, often at odds with each other and other levels of system. The

productive parts of the communication system are in or near maturity. Traditional content industries like news, music publishing and TV are in the mature conservation phase. Telecommunications went through a re-organization following the Telecoms Act of 1996, and is in the exploitation stage, judging by the consolidation of AT&T and Verizon. Similarly, the disruptive market-oriented allocation of spectrum through auctions has been absorbed, and there are signs of maturity in the concentration of spectrum in a few hands. There are still pockets of reorganization left over from the last cycle, e.g. cable taking voice share from wire line telcos, and telcos threatening cable's video business. For all the hype, the PC/internet/web subsystem is well along in the exploitation phase and nearing maturity (e.g. Microsoft, Cisco, Google). Consumer habits have adapted to internet and the web, and have become mature.

2.3 *Surprise*

Unexpected novelty is another hallmark of complex adaptive systems – and one of the toughest challenges for a regulator. Changes in the state of a complex system are usually unexpected, in part because many dynamics are invisible. Surprises are particularly noticeable when they lead to release.

Here are some recent reminders that the innovation that we expect from complex systems usually comes as a surprise:

- Digital satellite radio expected to compete with traditional radio, not to be swamped by the iPod;
- Digital video as an alternative to broadcast TV came to prominence as low-quality, user-originated content on YouTube, rather than as high quality Video on Demand via cable or DSL; [this is characteristic of disruptive technologies]
- The explosion of Wi-Fi (and CDMA cellular telephony) was the consequence of esoteric decisions about unlicensed rules by the FCC in the mid 1980's; the latter was also fuelled by a decision by the FCC not to mandate a 2G standard in the 1990s.
- The collapse of music publishing – the industry lost a third of its revenues between 1999 and 2006;
- The eclipse of commercial encyclopedias by user-produced content on Wikipedia.

Many surprises come from contagion between problem domains that were previously considered distinct. XM/Sirius's problems came at the intersection of personal computing devices with broadcasting; music publishing's crisis arose from software and networking innovations that led to the P2P distribution of digital content; and the open source software movement informed Wikipedia.

The creative power of market disruptions was highlighted by Schumpeter, and the dynamics of disruptive technologies popularized by Christensen. Schumpeter may have been inspired in part by Nikolai Kondratieff's theory of long-wave cycles, which resonates with the adaptive cycle described above. According to Schumpeter, innovation by entrepreneurs leads to gales of "creative destruction" as innovations cause old inventories, ideas, technologies, skills, and equipment to become obsolete. In the adaptive cycle model, the collapse of a mature system opens up opportunities for innovation during the reorganization phase.

3 Response, Part 1: New Capabilities

Complex adaptive systems, like 21st century communications, are by definition difficult to understand and control. It is often unclear whether they can be managed at all. However, society has well-established expectations of the FCC regarding the policy mandates of consumer protection, economic vitality, public safety, raising revenues, and the protection of culture and values.

The staff members of the FCC as currently constituted do a valiant job. However, the use of new techniques, and changes to the organization's structure would enable them to be even more effective in future.

The challenge of managing a complex adaptive system calls for particular Commission capabilities techniques to be added or enhanced. This section will discuss each in turn:

- Principles rather than rules
- Modeling and simulation
- Self-regulation
- Transparency and intelligibility
- Data gathering and interpretation

3.1 *Principles rather than Rules*

The goal of policy is to understand the present, anticipate the future, and plot a course between the two. Since present reality is changing ever more quickly, detailed rules and regulations will often be obsolete before they have been finalized. Responses will necessarily be ad hoc, but they don't need to be arbitrary: in a complex world, principles are a more appropriate technique than detailed rules.

In a New Yorker article about the recent financial crisis, James Surowiecki used a sport analogy to explain the difference between principles and rules:

It's something like the difference between football and soccer. Football, like most American sports, is heavily rule-bound. There's an elaborate rulebook that sharply limits what players can and can't do (down to where they have to stand on the field), and its dictates are followed with great care. Soccer is a more principles-based game. There are fewer rules, and the referee is given far more authority than officials in most American sports to interpret them and to shape game play and outcomes. For instance, a soccer referee keeps the game time, and at game's end has the discretion to add as many or as few minutes of extra time as he deems necessary. There's also less obsession with precision—players making a free kick or throw-in don't have to pinpoint exactly where it should be taken from. As long as it's in the general vicinity of the right spot, it's O.K. (James Surowiecki, "[Parsing Paulson](#)", *The New Yorker*, 2 Dec 2008.)

Pursuing this metaphor, the FCC is not only the referee of a football game, it also makes the rules – often as the game goes along.

All shapers of adaptive systems, such as administrators of resource management agencies, telecoms regulators, legislators, and company executives, have rules of thumb for coping with

unpredictability and complexity. I have been particularly inspired by the work of Buzz Holling and his colleagues on managed ecosystems, which are a useful analog to 21st century communications. Both ICT and ecosystem managers have to deal with the confluence of socio-political systems and largely self-driven “subject” systems. In ecosystems the subject is biology, and in ICT it is the intrinsic, self-directed creativity of technology. The following principles distill the experience of managing such systems.

1. **Flexibility.** Determine ends, not means. Describe and justify the outcomes sought, not the methods to be used to achieve them.
2. **Delegation.** Let the market and society solve most problems, not government. Government's role is to provide proper incentives and guidance, and to address critical failures.
3. **Big Picture.** Take a broad view of the problem and solution space. Favor generic over sector-, technology- or industry-specific legislation.
4. **Diversity.** Seek and support multiple alternative solutions to policy problems. Encourage competition and market entry.

These are not techniques that all communications policy makers are used to using. Table 1 sketches the situation in communications policy, and indicates how FCC regulators could implement the principles. (The actions that follow from the principles vary depending on the level of management, e.g. developing policy vs. writing legislation or regulating.)

Table 1: Current and proposed application of the principles in regulating communications

Principle	Ways in which the current approach is at odds with a principles approach	Recommendations for implementing principles by a regulator
Flexibility	Detailed intervention by specifying a command-and-control mechanism for achieving a societal goal – from merger conditions, to pricing network elements, to the exact allowed uses of a spectrum license – has been the rule, and is embedded in custom and statute	Use principles rather than rules. Ensure backstop powers are available if self-regulation fails. Rules, if used, should be technology and business-model neutral. Build in capacity to deal with the unexpected.
Delegation	Delegation is at odds with the traditional top-down control of telecoms and broadcasting	Intervene if players close to the action demonstrably fail to solve problems flagged by the regulator, or in legislation. Avoid ex ante action unless there is a high probability that a market failure will be locked in.
Big Picture	The industry silos that underlie the titles of the Communications Act enshrine a “little picture” approach, where problems are solved piecemeal and in isolation	Avoid silo-specific regulation. Develop an integrated understanding, based on in-house expertise, of the industry and its social context. Use scenario planning to prepare for contingencies such as the

		entrenchment of market failure
Diversity	While lip service might be paid to diversity and innovation, regulatory capture by industry incumbents prevents competition; the desire for (illusory) control has traditionally seduced regulators into focusing on single rather than multiple solutions	Don't entrench one solution through regulatory preference. Define markets broadly for competitive analysis.

The FCC is already using a principles-based approach in some cases, with positive results. The most striking example is in wireless regulation, where the transition from command-and-control rules that specify the both deployment schedules and allowed technology and service offerings in great detail (e.g., the introduction of digital television) to technology and service neutral operating rules has led to great innovation in cellular telephony and unlicensed wireless networking. In other areas, such as CALEA compliance and content line-ups for cable, a rule-based orientation still prevails.

3.2 *Modeling and Simulation*

It is difficult to predict how complex adaptive systems will respond to interventions. Unintended consequences are the rule, not the exception. Experimentation before deploying new rules can reduce the likelihood and impact of inevitable blunders.

All participants in a complex adaptive system, including regulators, have to innovate to keep pace with ever-changing circumstances. However, change carries risks. The system will adjust to new rules as soon as they are promulgated, and there's no way to turn back the clock.

The ability to try out new ideas in state and local jurisdictions is a useful feature of the United States' federal system. However, new ways to conduct "safe to fail" experiments are needed because geographies are less isolated than they used to be, and the compression of social time through technology means decisions have to be taken more rapidly. System modeling made possible by the advent of cheap, fast computing provides a safe way to try out regulatory ideas.

Exploring the consequences of policy choices in simulation can identify which courses of action are most robust under a variety of possible outcomes, and can identify critical preconceptions and biases. It can identify policy choices that are brittle and work in only a narrow set of circumstances, thus leading to more resilient final measures.

Techniques developed for business modeling, social analysis, and long-term policy planning can be applied to the internet/web. For example, agent-based simulations of internet access in the US provide insight into the dynamics of network neutrality regulation. It would be instructive to explore whether the resulting system has multiple stable states, as one might expect from a complex adaptive system. For example, there might be two (or more) stable consumer broadband industry structures at a given access provider revenue level. One state might have a high degree of network neutrality and low media concentration (i.e., great diversity of content providers), while the other has differential pricing and exclusive content/access partnerships, and a higher media

concentration (i.e., lower diversity of content providers). If this can be the case, and if transitions between the states is difficult, then increased vigilance regarding irreversible transition into a low-diversity content arrangement is called for. Once such a model is in place, one can extend it to do resilience analyses, and factor in political power.

No single model is sufficient; indeed, a focus on a single correct but incomplete model generates long-term problems even while satisfying short-term objectives. Simulation – agent-based techniques as well as traditional econometric modeling – needs to become part of the standard way all parts of the organization make decisions. Other areas of regulation are adopting this approach. The meltdown of the restructured California electrical power market, which implemented a market design without adequate testing, has led to a surge in the use of agent-based computational economics to combine an understanding of the physics of grid operation with an analysis of incentives.

3.3 Self-regulation

There is growing interest in the value of self- or co-regulation as a way for regulators to delegate control in the fast-moving communication industry. It is part of a continuum of approaches ranging from no formal government action, through to full statutory regulation. Industry self-regulation can be more flexible and less costly for both business and consumers than direct government involvement. It is most likely to be effective where there is trust between government, industry, and consumers; enterprises recognize the importance of responsible behavior over the long term; and non-compliance by rogue companies can be contained.

Allowing or encouraging appropriate self-regulation is a way for the FCC to implement the Delegation principle. This is delegation, however, not abdication of responsibility: the Commission retains the responsibility for discharging its social mandates (consumer protection, economic vitality, etc.), but does not necessarily have to use regulation to do so. The FCC has historically done this through “raised eyebrow” rather than transparent and self-conscious formal decision making.

3.4 Transparency and Intelligibility

Visibility into the workings of a complex system reduces volatility and improves resilience. But how does one get timely information about an elaborate, rapidly-changing socio-economic system like the internet/web? Since funding for monitoring by regulators is limited, it is important to enable surveillance by civil society and the market itself.

Internet/web technology itself facilitates monitoring. It makes information more immediately accessible, and enables peer-to-peer disclosure and the pooling of information and knowledge. The pioneers like Zagat, Amazon Reviews, and Wikipedia are being joined by “vigilante transparency” organizations monitoring civil servants, campaign contributions, internet service providers, and even nannies.

One of the lessons of the sub-prime mortgage crisis is that a lack of intelligibility was more problematic than too little transparency. Nobody understood the ramifications of the financial instruments they were creating, managing, or (not) regulating. While it’s true that eliminating

complexity could stifle innovation, that's a false choice; nobody would seriously propose to eliminate either complexity or innovation.

What is needed is an accounting of intelligibility in the regulatory calculus: a way to measure whether a particular course of action is understandable by regulators, citizens, and the agents undertaking this behavior.

One metric is algorithmic complexity, a measure of the computational resources needed to specify an object. Another method is an abstraction ladder: the more steps between a derivative and its underlying asset, the higher it is on the abstraction ladder, and the less intelligible and more risky it should be deemed to be. The networking stack is an example: from physical wires in the ground one climbs up in abstraction to links, networks, sessions, and applications. On the premise that atoms are easier to observe than bits, and that piling up inscrutable and unstable combinations are easier the higher you go, services at higher layers will be subject to closer regulatory scrutiny, other things (like market concentration) being equal.

Transparency/intelligibility need not be mandatory; companies should be able to choose obscurity. However, the choice of shrouding their activities could incur the cost of increased regulatory scrutiny – and perhaps higher expectations regarding performance against public interest mandates. For example, Comcast need not explain exactly how it manages its network; but if it chooses obscurity, it should face tougher network neutrality expectations. Microsoft need not disclose its interfaces; but if it chooses obscurity, it should face tougher anti-trust tests. Google need not explain how it uses DoubleClick data to improve ad click-throughs; but if it chooses obscurity, it should face tougher privacy protection requirements.

4 Response, Part 2: New Organization

These new techniques will only bear fruit in a suitable institutional setting.

4.1 Improve data gathering

All the techniques described above depend on actionable knowledge. The variability and unpredictability of adaptive systems means there cannot be a single, fixed, optimal strategy. The only viable approach is continuing learning and adaptation. As society and technology change ever more quickly, the institution has to learn faster and plan better. The FCC needs to be a learning organization which adapts at a much faster rate than was required in the past.

It is vital that the Commission seeks information about changing technologies. The Office of Engineering and Technology (OET) and Office of Strategic Planning & Policy Analysis (OSP) can play a vital role, as demonstrated in the adoption of rules that enabled the civilian use of spread spectrum, as documented by Mike Marcus. It should also draw on outside expertise, such as the Technological Advisory Council (TAC), the National Academies, and consultants from federally funded research and development centers, as recommended by the IEEE in its letter to the Chairman of the FCC of June 5, 2008.

The FCC cannot do all the work of data gathering and interpretation itself, but neither should it be entirely beholden to interested parties to a proceeding, who furnish only information that advances their cause. Even if the input were not biased, one would still need in-house expertise to make

informed choices. The Commission has this level of expertise in wireless technology, but perhaps not to the same degree in internet/web technology. Staff can make nuanced judgments about the likelihood and mitigation of radio interference, but has less experience judging network management claims, the implications for consumer privacy of data aggregation and behavioral advertising, or the most effective way to implement law enforcement surveillance on the internet.

The FCC needs to rethink how it can involve a wider community in data collection and analysis. This community includes interested citizens, industry, research vendors, and think tanks. The FCC could also make more use of outside paid consultants, which have been employed too rarely in recent decades. The goal should be to improve the speed and quality of both data collection and interpretation by opening up the process to commercial interests and citizen-consumers.

The Commission should explore new ways to inform its decisions and act on behalf of citizens, such as opinion polling. This technique is used by other regulators, e.g. the FTC and Ofcom, but apparently not by the Commission.

The data that the FCC currently [reports](#) is organized by the old-line industry silos, and largely ignores the structure of the 21st century market. There are data for common carrier traffic, competition in satellite services, the cable industry, and wireless – all given separately. Many vital current issues are not covered, such as: the assessment of the consumer value of auctioned spectrum; an inventory of the utilization of spectrum under both NTIA and FCC management; consumer data aggregation practices. The focus of its efforts should also change, with a higher priority on exposing the underlying data; as Robinson, Yu, Zeller and Felten have argued, government should provide the underlying data, but the websites that provide interactive access for the public can be built by private parties.

The agency should foster a culture and capability of data collection with the goal of learning, not bookkeeping. All these activities can be delegated in part, but in all of them the FCC should retain an in-house capability. The Commission will always be catching up with data collection requirements, since the industry changes so quickly. An institutional habit of identifying new data needs and fulfilling them is just as important as high quality reporting against current mandates.

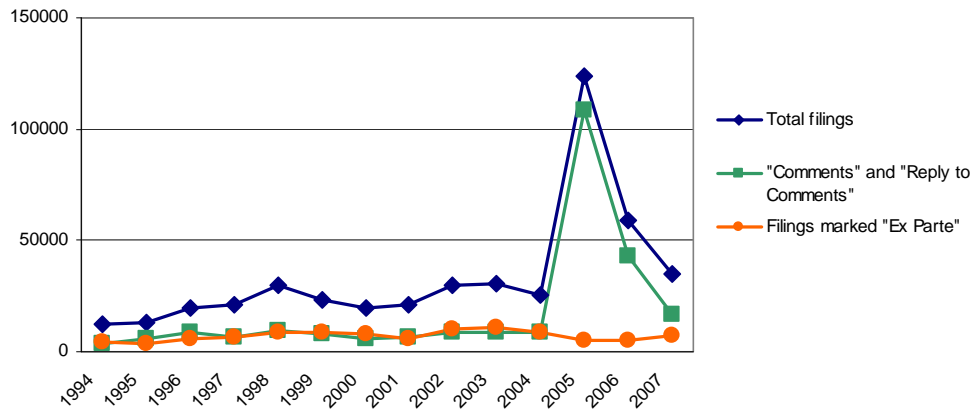
4.2 Improve in-house expertise and institutional memory

Once data has been collected, it needs to be internalized. There are many interpretation challenges, not least the flood of short comments generated by particular proceedings, which has been facilitated by laudable efforts to involve the public. For example, in 2006 there were 10,831 one- or two-page filings (excluding ex partes) on FCC Docket 06-74, the AT&T/BellSouth merger; they were essentially all from individual citizens. This was 18% of all the filings in that year (59,081). By comparison, in 2004 there was a total of 25,480 filings. (See Figure 3 for more data.)

This is part of the larger challenge of managing multiple constituencies. Not only has the number of industries with an interest in ICT grown beyond telecommunications and broadcasting, to include internet content providers, software companies and new broadcasting media, but the public has become increasingly engaged.

Figure 3: Annual Filings at the FCC, 1994-2007

Source: ECFS metadata



The FCC needs to have a strong, in-house basis for understanding the state of play, and anticipating developments. This is necessary both to make smart decisions about how (and whether!) to intervene through rulemaking, and to make smart/robust rules. Learning and planning are tied together through simulation and other safe-to-fail experiments.

For example, successfully applying self-regulation entails a capability to make informed judgments about whether the socio-economic context is conducive to effective self-regulation in a particular case, and whether self-regulatory organizations are meeting their responsibilities once delegated. As with all the techniques discussed here, new capabilities have institutional consequences; this will be discussed below.

The multiple uncertainties of adaptive systems mean that every institution needs a long memory. Slow variables are often the ones that trigger radical change, but they can only be observed with prolonged attention. The institution needs a strong, constantly renewing base of career officials that can bridge across the terms of political appointees. There has been a renewed awareness in recent years of the degree to which the tenure of career professionals can be vulnerable to political processes.

Individuals matter. The interlinking of activities at various layers of a complex system means that in-house entrepreneurs (and reactionaries) can have disproportionate influence, particularly when a system is in flux. It's important to foster independence and adaptive management skills, particularly in the American setting where top leadership is politically appointed, and changes frequently. Secondments like Chief Economist and Chief Technologist are an important tool, and should be complemented with fellowships from industry and academia at middle and entry levels in the organization.

4.3 New Structure

Developing an open, adaptive and principles-based approach to policy making, and building the capacity to perform new functions, will require changes in the institution's organization.

The FCC is currently [organized](#), in large part, to reflect the Titles of the Communications Act(s): the Wireline Competition Bureau is responsible for wire-based telephony; the Wireless Telecommunications Bureau oversees spectrum, including cellular telephony; the International Bureau covers satellite and international matters; the Media Bureau regulates radio and TV services. However, the mapping to statute is not exact, which suggests that organization by Title is not a necessity: a re-organization does not require a new Communications Act.

Such a structure cannot effectively address questions that cross industry boundaries – which, in the 21st century, is most of them.

A more effective and stable structure would be organization by policy mandate. This would replace the industry-oriented bureaus by departments with explicit, technology- and industry-neutral responsibilities for the key social mandates.

The rudiments of such an organization already exist; the Public Safety & Homeland Security Bureau is responsible for public safety across industries. Other bureaus would have to be split up among domain-oriented departments. The responsibilities of the departments replacing existing bureaus would include:

1. **Public Safety:** Protecting citizens is a primary responsibility of government. Responsibilities would include access to emergency services, law enforcement surveillance, data retention, and child safety.
2. **Consumer Protection:** Privacy, fraud, fair trade terms, access for those with disabilities, device certification, universal service, digital inclusion.
3. **Culture & Values:** Control of speech (obscenity, violence in media), rules on advertising, including political advertising, state funding for content production
4. **Markets:** A healthy market produces goods and services that citizens value. Responsibilities include fostering innovation, establishing frameworks for property rights, facilitating market entry, encouraging competition, enabling interoperability and interconnection, and addressing market failures; managing the allocation of public goods like telephone numbers and wireless licenses; and growing domestic capacity through industrial and trade policy.

In a perfect world, the FCC would not deal with taxes, fees, levies, and subsidies since industry-specific taxes distort markets. In practice, legislators have attached, and will continue to attach, revenue mandates to communications measures. One response is to create a “Revenues” Department, which administers all taxes, fees, levies, and subsidies. However, while this reflects a distinct mandate, there are substantial overlaps with other Departments. In this proposal, therefore, responsibility for funds is distributed among the other departments. For example, both raising and distributing universal service levies fall is the responsibility of the Consumer Protection Department. Rate regulation, e.g. of non-distorting interconnection, and managing wireless license auctions, falls under the Markets Department. If cross-departmental conflict results, it may be necessary to create a central Office of Revenues, similar to the current Office of Engineering and Technology, to improve coordination.

The intersection of the responsibilities of existing bureaus with the new departments that would replace them is summarized in Table 2.

No reorganization is perfect, or without cost or risk. However, there are substantial advantage to such a re-arrangement:

- An alignment with policy mandates will be more stable over time than one based on technology or industry segmentation, which is in constant flux.
- An organization structures by public interest mandate would require and enable the Commission to take a big picture approach in every case, and not limit staff to supervising or nurturing a particular, soon-to-be-obsolete industry category.
- It would weaken the ability of incumbents to dominate all rule makings applicable to them by focusing on a single bureau.
- A department focused on market issues would highlight the complements, overlaps and conflicts between the FCC and FTC in the anti-trust area.
- The inclusion of spectrum allocation issues within a department charged with maximizing the economic value of national resources would call the question of the divided FCC/NTIA management of spectrum in the US, and may provide a path to the long-term resolution of this inefficient anomaly.

Table 2: Redeployment of Bureau responsibilities to new Departments

Proposed new Departments →	Public Safety	Consumer Protection	Culture & Values	Markets
Existing Bureaus ↓				
Public Safety & Homeland Security Bureau	x			
Consumer & Governmental Affairs Bureau		x		
Media Bureau		x	x	x
Wireless Telecommunications Bureau		x		x
International Bureau				x
Office of Communications Business Opportunities				x
Wireline Competition Bureau				x

Enhancing capabilities like contingency planning, data analysis, and simulation could also lead to restructuring the Offices that serve cross-organizational roles. For example, a modeling group might logically be housed in either the OET or OSP. One can make a case that combining the two Offices would reinvigorate staff in both. Both are tasked with providing expert advice, but OET focuses on radio engineering, while OSP houses lawyers and economists. The necessary cross-disciplinary work will be easier to accomplish in a single organization, even though inter-disciplinary incomprehension may be an obstacle in the early days.

5 Is now the right time?

One needs to ask not only how to reform, but whether to do so now.

Reform is a phase in the adaptive cycle: it is the reorganization that follows the crisis of a release phase. While release and restructuring is necessary for the long-term health of a system, it can be painful. Reform necessarily dissipates the capital accumulated during growth and maturity (the exploitation and conservation phases); it is not something to be embarked on lightly. Is now the right time to reform the FCC?

The goal of wise management is to keep disruptions from flipping a system into an undesirable state, while encouraging the innovation and experimentation that comes with reorganization – not vainly trying to stop restructuring from happening at all. A policy maker's responsibility is to shape change to conform to public interest mandates, not to stop it. Delayed re-organization amplifies the eventual crisis, increasing the risk of landing up in an unhealthy state; too frequent or premature re-organization never allows the full accumulation of the potential that can fuel the next restructuring cycle.

Are the risks acceptable? One of the prices to be paid is that tools that one needs to manage the system are disrupted during reform. For example, trust is an important ingredient of self-regulation, which will be important in the new approach – but trust requires stability, which is reduced during a reform. Fortunately, industry is in a relatively stable phase at the moment, which can accommodate and smooth over disruption at the Commission level. This gives the FCC an opportunity to change while not endangering the stability of the whole system

A new Communications Act might trigger reform, but that is neither necessary nor likely. Congress will be the last to respond to the complexification of communications. Members, particularly influential ones, are typically long standing office-holders with entrenched patrons and perspectives. They will resist the threat to their patronage entailed by a re-organization of regulatory action. When they do act to reform, it will probably be in response to an existential threat to a powerful old-line industry – which will tend to entrench, or at best resist attempts at blurring, existing ways of doing things.

Re-organization will therefore have to be driven by the Chairman, with all the risks (and opportunities) of a process that depends on a single big ego. The choice of a new Chairman will therefore have far-reaching consequences for the effectiveness of the organization.

6 Conclusions

There is no a priori limit to the number of true statements one can make about a complex, adaptive system, and many of them will be at odds with one another. The role of a regulator is therefore not to establish the ultimate truth as the basis of a correct decision, but rather a never-ending quest to make the best possible call given what can be known at a given moment.

This reality has become more visible and more pressing as the stable world of 20th century communications gives way to the flux of the 21st century internet/web. Even while understanding grows that the FCC's influence is limited, there is no doubt that it still has great influence, and important responsibilities. The addition of new techniques to its repertoire and a corresponding

restructuring of its organization will be essential to wielding its influence wisely, to the benefit of citizens.

The new approach proposed here is premised on dynamics that affect not only the FCC, but all actors in the communications system. These arguments, and all debates about how to reform the FCC, therefore also apply to the broader question of governance of 21st century communications.

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