

Towards an Innovation-Co-evolution-Complexity Perspective on Communications Policy

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Introduction*

Current media change is leading to a digital destabilization in the communications industry, in communications policy and also in communications science. How can these changes be adequately grasped? A variety of theoretical approaches are applied, ranging from rational choice to systems theory and constructivism, but at the same time there is a combination of perplexity and disagreement among scholars. This becomes obvious in the analysis of the current media crisis and the discussions of a “new communications science” (Löffelholz & Quandt, 2003) triggered by media change. The debate runs through the poles of continuity and paradigm shift, from conclusions that “the new is the old communications science” (Brosius, 2003) to the diagnosis of a paradigm shift in communications (van Cuilenburg & McQuail, 2003). Different theoretical approaches generate different value added, and although there is no general right or wrong, depending on the specific research questions there are more or less analytically helpful approaches.

This paper proposes to analyse media change as an innovation-driven, co-evolutionary process in a complex environment, using a combined innovation-co-evolution-complexity perspective. It leads to additional and different findings on media change in general, and on communications policy in the era of the Internet and digitization in particular.

The first section outlines the innovation-co-evolution-complexity approach and explains why it should be applied to communications. It is meant to supplement current mainstream approaches, and one of the challenges is how to combine it, for example, with governance theories. The second section highlights the implications of this approach for communications policy and its analysis.

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1. Innovation, co-evolution, complexity: towards an integrated approach

1.1 Innovation as the nucleus of change

There are various reasons to apply innovation theories to communications. First, innovations can be considered as the nucleus of many forms of change (Hall & Rosenberg, 2010). They are central driving forces of the dynamic developments of societies in general and of communications sectors in particular. A wide Schumpeterian definition of innovation, embracing the three phases of invention, market introduction and market diffusion, makes it possible to grasp the different kinds of change in the communications sector.

Second, innovation-theory approaches are perfectly adequate for the analysis of all constitutive elements of a medium from a communications-theory perspective (Saxer, 1998): the technical communications channel, its institutionalization and its complex organization. The cultural aspects of media are internalized via institutionalization and contextualization. Media organizations and other relevant agents act on the basis of cultural institutions and norms, values and traditions that impose limits on the possible options for action. This happens at the micro-level of media companies as well as at the meso- and macro-level of communications policy.

A third advantage is that innovation theories allow a better integration of technological features and change in the analysis of communications. This is of particular importance for communications policy analysis if the regulatory role of technical code and the Internet architecture are to be taken into account.

Nevertheless, media innovations are still mostly analysed in communications without the application of innovation theories, which are most prominently contributed by economics and sociology (Hall & Rosenberg, 2010; Braun-Thürmann, 2005), leaving a high degree of unutilized potential in communications. Reasons vary, ranging from limited awareness to vague scepticism, focusing on the relevance and impact of technology and criticizing a mere “fascination with technology”, a “techno-centrism” and “technological determinism”. This criticism often overlooks the fact that innovation theories not only focus on technology but also on social and organizational innovations, and further that technology does not play a secondary role in media change. It underestimates the role of technology, ignoring the early work of Innis (1951), Pool (1983), and the more recent work of Benkler (2006), Lessig (2006) and van Schewick (2010).

It also overlooks the fact that technology is not only formed by society, that it can be also active as a structure, institution and even as an actor (Dolata & Werle, 2007). Technology is not only the output but also the input to an economy.

1.2 Co-evolution and complexity

Driving forces of media change are technological, economic, political and cultural (Latzer, 2009b), leading to the crucial question of how these different kinds of innovation interrelate. To approach this

question, innovation can be combined with evolution, which constitutes a meta theory of change (Schneider, 2008). According to this perspective, innovation processes are understood as co-evolutionary adaptive cycles of renewal and are assessed as evolutionary processes, characterized by variation and selection. Cooperation, an important feature of peer-production in the digital economy (Benkler, 2006), is another central principle of evolution (Nowak & Highfield, 2011).

Evolutionary terms and approaches not only have long history in biology but also in social sciences (Nelson, 2000; Merz-Benz, 2010), also regarding technical change and technological evolution. A Darwinian model regarding selection processes for technical change was introduced in social sciences, for example in the work of Nelson and Winter (1982). Alongside its metaphorical, selective application there have been efforts in the social sciences to develop a precise formulation of an evolutionary theory of technological change as part of cultural change (Nelson, 2000). Biological and technological evolution show similarities, but they are not the same. There is no natural selection in the technical field, there are strong design efforts, and there is nothing like genes in technology.

There is no cross-disciplinary general evolution theory, but biology and technology can both be considered as part of the family of complex systems (Ziman, 2000), which share the selectionist paradigm and features such as non-linear development, emergence and feedback-loops. They are both systems where large networks of components without central guidance and with only simple rules at the individual level develop a complex collective behaviour with highly developed information processing and an ability to adapt via learning or evolution (Mitchell, 2009). Complexity theories, which can be regarded as a modern version of evolutionary theory (Schneider, 2012), offer concepts to explain and integrate basic properties such as non-linearity, emergence, adaptation and networks, which play a central role in media change. They offer qualitative and quantitative, mathematically modelled approaches that can be fruitfully connected with traditional governance theories (Schneider, 2012).

Taking all these complexity features of change into account, co-evolution is a helpful concept for analysing media change in general and communications policy in particular, for example as a co-evolving complex adaptive system (Cherry, 2007). While evolution can be characterized as design without a central designer (Dennet, 1995), co-evolution – also called co-construction or confluence (Benkler, 2006) – means designing and being designed at the same time. Co-evolution, understood as a durable relation between agents that influence each other's evolutionary paths, is marked by a complex, in other words adaptive, non-linear system behaviour. This means that different processes in politics, economics, technology and society are driven by mutually selective pressure or adaptation. Another characteristic is the high degree of coincidence in these developments. This explains the interplay – more precisely the pressure and adaptive behaviour of technology, organization and business models, which nurture each other (Beinhocker, 2006). Altogether, this concept overcomes the

hotly debated antagonism to technological and social determinism (Rip, 2007) and also sheds a different light on media change.

2. Implications for communications policy and its analysis

Communications science in the Internet era faces a situation where theories, classifications and research findings have been elaborated on the basis of a techno-economic reality that no longer exists. A good example is the technology-based classification into broadcasting and telecommunications, which is losing its analytical value (Latzer, 1997; 2009b). This dilemma is mirrored in communications policy and regulation, which were based on technology-oriented classifications. Convergence suggests an integrated policy approach, a change from separate media and telecommunications policies toward an integrated national or supranational communications policy (van Cuilenburg & Slaa, 1993; Latzer, 1998; van Cuilenburg & McQuail, 2003). However, policy-makers have reacted to these challenges with some delay. An analysis of worldwide governance reactions to convergence nevertheless points to the emergence of a modified common governance pattern for convergent communications markets in the mediamatics era, with the new common features of functionally based, technology-neutral classifications and horizontally integrated regulators and laws (Latzer, 2009b).

But problems with outdated classifications and dichotomies – such as public and private, sender and receiver, mass and individual communications – are far from the only challenges for communications policy in the Internet era. There are many others – how to deal with non-linear media developments, with emergent phenomena in media change, with limited predictability and controllability in a complex ecosystem, with the regulatory role of the technological architecture and with the phenomenon of user involvement and cooperation in the Internet. There is a search for a scientific foundation appropriate for dealing with these aspects of the research subject.

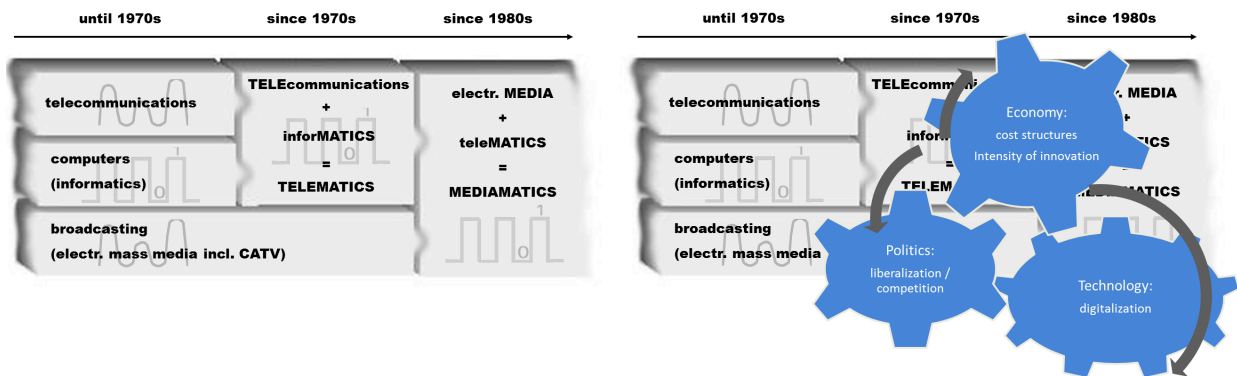
The proposed combination of innovation, co-evolution and complexity perspectives offers additional and different results from other theoretical approaches, with implications for communications policy and other sub-sectors of communications science. These consequences can be summarized as (1) changing perceptions of the object of investigation (media change), and of the basic conditions for policy-making (predictability, controllability, role of the state), leading to (2) changing general guidelines for policy-making.

2.1 Changing perceptions

2.1.1 Media change, convergence and the Internet

A co-evolutionary perspective highlights the mutual interplay of political change with economic, technological and socio-cultural changes, which can be briefly outlined using the example of convergence in the electronic communications sector (Latzer, 2013b).

Figure: Co-evolution in media convergence



In simplified form this figure shows two convergence steps in the co-evolution of a transformed societal communications system. First, a convergence of telecommunications and informatics towards telematics (Nora & Minc, 1978), and a second convergence step of mass media and telematics towards mediamatics (Latzer, 1997). In the 1970s, the starting point for the recent cycle of co-evolution is on the technological side an analogue telephone technology, and on the political-economic side a (state-owned) monopoly. Technological innovations of digitalization also changed the economic conditions (especially the cost structures) in a way that weakened the economic argumentation for monopoly regulation in the telecommunications sector. There was liberalization at the political level, and the resulting intensifying competition at the economic level increased the innovation intensity on the technological side. Fuelled in this way, co-evolution constantly increased and boosted the spin of the interconnected innovation cycles. The innovation activities in telematics merged with those in digital broadcasting and moved in a co-evolutionary way towards the formation of the mediamatics system (ibid.).

Co-evolutionary explanations are used in particular in complexity theories. A characteristic of complex, evolutionary systems is emergence, that is, the unforeseen appearance of new structures and characteristics in a system that are not directly derivable from existing, older characteristics. Mediamatics is also an emergent phenomenon. The result is greater than the sum of its parts and cannot be simply understood in terms of them. Further, with mediamatics, no single all-embracing uniform medium evolves, but a “digital modular construction system” (ibid.), which introduces great flexibility for innovatively assembled new services and products. The previously rigid combination of technology and content (services) is dissolved. In addition, not only professionals can assemble new services, but so can end-users, adding extra dynamics to the process of change.

The perception and conceptualization of the Internet is decisive for policy-making in the Internet era. The combined innovation-co-evolution-complexity approach reveals special features. It presents the Internet, the communications sector and policy-making as a co-evolving complex, adaptive system (Cherry, 2007) characterized by non-linear developments, emergence and decentralized structures. It

highlights not only the content of the Internet but in particular the importance of infrastructure, which is best described as a modular, open system. It has an end-to-end design that allows innovations at every node of the network, by any user, leading to the modular, digital construction kit, described above. The Internet is a modular, construction system, it is an innovation machine, and for communications policy it is important to understand that code is law, that architecture is politics (Lessig, 2006). This makes a difference when the end-to-end design is at stake, as for example in the debate on policies regarding network neutrality (Cave & Crocioni, 2007).

2.1.2 Predictability, controllability and the role of the state

From an innovation-co-evolution-complexity perspective there is very limited predictability and controllability of evolutionary developments, leading to different conclusions regarding the role of the state. Two decades ago, nobody predicted the Internet would look like it does today, and even the retrospective explanation of its development is difficult and contentious (Whitt & Schultze, 2009). This situation is not new in the development of media. The development of mobile telephony, another central driver of current media change, was also seriously underestimated. Altogether, the history of media can be seen as a history of wrong predictions. All these failed prognoses are at the same time indicators of the limited steerability of change, because there has never been an absence of attempts to control developments. There is the recurring hope that this time it will work better. Nevertheless, there is growing scepticism towards theoretical approaches that focus exclusively on rational behaviour, perfect information and transparent markets.

If evolutionary and complexity approaches are applied, then the question immediately arises of whether governments have any role at all in these perspectives. The history of the Internet, of a complex, adaptive system, can serve as an example for the continued role of the state (Post, 2009; Whitt & Schultze, 2009). It even played a central role in its development. The Internet was heavily publicly supported for decades, and it took three decades from its invention to successful market introduction. It is a singular product of the interplay of market and non-market forces. The final product was neither politically intended nor predicted – it is the product of a co-evolution of technology, politics and markets.

We can see from this example that political activities are essential, but what can we learn about the specific role of politics as one of many agents, about its possibilities and strategies in complex evolutionary systems?

It should be kept in mind that media change does not follow a biological evolutionary model, that neo-Darwinism overlooks the possibilities of anticipating future selection and takes no account of the fact that expected developments and implications – for example that liberalization increases diversity and decreases prices – already influence the selection of future policies. Anticipation is important and governance research and political consulting are central to their formation (Voss & Bauknecht, 2007).

We are confronted with conscious design and control attempts, with attempts to tame a selection driven by market forces – although these attempts frequently have unintended results. Co-evolutionary processes cannot be controlled in one specific direction. Existing patterns are reproduced, and new rules are emerging (Nelson & Winter, 1977).

Complexity is a state between perfect order and complete disorder (McGlade & Garnsey, 2006). From a co-evolutionary perspective, techno-economic media innovations and governance innovations are interdependent. But not all governance innovations (for example self- and co-regulation) are equally well-suited to ensuring the functioning of media technology. Hence there is selection, depending on the specific socio-technical structures, for example in the emerging convergent communications system of mediamatics. A co-evolutionary perspective points out that technology is not only the output, but also an essential input to the economy, and technology can be effective as a structure, actor or institution. In a complex system, governments are not all-knowing agents. In principle, in complex, adaptive systems no single agent can successfully pick winners or losers. It is a design without central designer. At the best, developments can be triggered in a certain direction. Media change is neither exactly predictable nor purely coincidental.

2.2 Changing policy guidelines

Based on these features, the innovation-co-evolution-complexity perspective leads to different strategic policy guidelines for communications policy, for the convergent mediamatics policy in general and for Internet politics in particular (Cherry & Bauer, 2004; Cherry, 2007; Longstaff, 2002; Latzer, 2009b):

Taking into account the very limited predictability resulting from this perspective, communications policies seek less to dictate developments, as has been done for many decades in communications (e.g. digitization, videotext, broadband). Further, policy-makers rather avoid an attempt to pick winners from technological alternatives and different business models, as was frequently the practice previously. Instead, communications policy is more oriented on enabling and fostering co-evolutionary processes. This can be accomplished by the creation of a favourable framework.

Another strategic reaction is to strengthen adaptive policies (Cherry & Bauer, 2004; Cherry, 2007), for example by including feedback loops in the governance process with periodic reviews and revisions of laws, or with public consultations. The new focus is to encourage the networking of actors, to support their access to knowledge, to enhance research and development activities, in general, to enable feedback mechanisms of co-evolutionary processes.

As only broad statements can be made about the future of systems, as politics cannot determine the “best” course of development, the thinking and proposals are argued in the form of scenarios and possible developments. In general, a trial-and-error method seems appropriate, as winners are not recognizable at an early stage. The development departs from single strategies, toward a portfolio of

experiments, which is used to strengthen early successes (Beinhocker, 2006). Public funding policies that increase the instrument of inducement prizes for successful innovations would be one example of such a strategy.

Finally, innovation theories also offer typologies of innovations with different social and economic effects, which can provide an orientation and strategic support for communications policy. Research on innovation typologies, for example, suggests that public support programmes should target radical and disruptive innovations rather than incremental and sustaining ones (Latzer, 2009a). This calls for special measures, as the development of radical innovations involves higher risks of failure. The inclusion of social innovations in research is also reflected in public support programmes. Moreover, innovation-theory results of Internet-features, such as bottom-up and user-driven-developments and short life-cycles, can be incorporated in funding schemes.

3. Conclusions

Altogether, the combination of innovation, co-evolution and complexity approaches facilitates a structured, systematic analysis with high added value. It helps to analyse various aspects of media change: the driving forces of change, its course of development as well as the consequences and the governance of media change. However, the proposed approach does not result in an all-embracing theory of media change or communications policy. Hence it poses the challenge of combining it with other more widely used theoretical approaches, for example with governance and regulation theories. Additional and different insights resulting from the innovation-co-evolution-complexity perspective do not necessarily overturn the findings of other theories such as new political economics or institutional economics (Schneider & Bauer, 2007; Bauer & Herder, 2009). An important contribution is that the complexity debate directs the focus away from purely reductionist, static assessments and includes systemic and dynamic approaches. One of the peculiarities of the complexity perspective is that each problem is addressed individually, as opposed to normative scientific approaches that seek universal solutions (McGlade & Garnsey, 2006; Mitchell, 2009). The evolutionary paradigm in social sciences does not claim to be a universal solution. It is an effort to make different concepts compatible with the evolutionary paradigm, for example, action theory based on rationality (conduct), including various governance approaches. Hence it is an addition to actor-theory approaches in communications, and at the same time tries to avoid the uncritical adoption of evolutionary and complexity approaches. One of the goals is the combination of bottom-up and top-down approaches.

It should be borne in mind that not everything in the communications sector is equally complex, several things are purely complicated. The degree of complexity varies greatly within the sector. However, with liberalization, digitalization and the rising importance of the Internet, the trend is towards increasing complexity, for example due to the rising number of agents and the increase in non-linear processes (Bauer & Herder, 2009).

The combined innovation-co-evolution-complexity approach leads to a specific understanding of the Internet as a digital construction kit and as an innovation machine. The basis for this assessment is the consideration of the specifics of its technological architecture. Its implications can be summarized as digital destabilization in politics, the industry and in research. Major consequences of this combined approach arise both for the framework of policy-making, and for strategic policy guidelines. They include changes in the basic perception of the predictability and controllability of developments, with repercussions for the role of the state – reflected in transformed strategic policy guidelines. An adaptive policy should enable and foster co-evolutionary processes. Altogether, communications policy should be systematically rethought against the background of the combined approach presented in this paper.

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