# 6. The Incomplete Paradigm Shift

Fig. 24. Carnival Against Capitalism –18 June 1999.

This chapter takes a bird’s-eye view of history, locating the developments of wireless community networks within a historical transition from industrial to information society. Following the thesis that this paradigm shift has become stuck, creating serious obstacles for realizing the emancipatory potentials of the information society, the conclusion can only be that those obstacles need to be overcome in order to realize *Society in Ad-hoc mode* as a positive, really existing utopia.

The historical context of the problems and issues regarding wireless community networks is what I call an incomplete paradigm shift. The term *paradigm* is used here in a specific and well defined sense. While the *paradigm* has been introduced into the scientific language by Thomas Kuhn’s seminal book *The Structure of Scientific Revolutions*,[[1]](#footnote-1) it has been given new meaning by the Innovation School in economics who, building on Kuhn’s work, coined the term *techno-economic paradigm*.[[2]](#footnote-2) Christopher Freeman and colleagues at the Science Policy Research Unit (SPRU), a semi-independent research institute connected with the University of Sussex, developed a theory of innovation in industrial societies. They claimed that technological progress since the beginning of the Industrial Revolution did not occur in a linear way, but in bursts and bouts, followed by periods of only incremental change. Influenced by the Austrian economist Joseph Schumpeter and by the Russian econometrist Nikolai Kondratiev, they argued that technological innovation was linked to the business cycle. It had long been known that economic activity in capitalist economies followed patterns of expansion and contraction. There is a short term cycle of three years and a medium term cycle of ten years, which Marx had already observed and commented on, but it has been Kondratiev, studying long term price developments of staple foods such as grains who found out that there were so called *long cycles* of 50 years, which could be separated in two parts, an upswing of 25 years, followed by a downswing of roughly equal length. Those time periods are not mechanical but research since Kondratiev has confirmed the existence of swings in economic activity of approximately between 40 and 60 years.[[3]](#footnote-3)

The period of a downswing, especially in its later stages, is usually experienced as a severe economic crisis. Schumpeter’s contribution has been to show that such a crisis can only be resolved by clusters of innovations. In order to resolve a crisis of a paradigm in decline, a new paradigm has to come into place. This new paradigm will typically consist of new *leading technologies* but also new business models and new ways of working. It is never just the technology alone which allows a paradigm shift to happen, but without technological change it would also not be possible. However, in order for this technological change to happen, mindsets of people also need to change, new laws need to be made, a wholly new business environment needs to be created. That explains why it takes such a long time, 25 years, a whole generation, for a new paradigm to come into place.

The Venezuelan economist Carlota Perez, who also worked with Freeman and SPRU, has developed a stylized model of paradigm change, which gives this whole development some further plausibility. According to Perez, the new paradigm develops inside the womb of the old one.[[4]](#footnote-4) Perez has divided the 50 years of the *long-cycle* into four quarters, separated by an interstice. The first quarter is when innovation gets started, usually by forward looking people, inventors, entrepreneurs, risk taking financiers, but also, I would add, artists, activists, and independent technological innovators. Once they have been able to show the feasibility of an innovation, others jump on the bandwagon and an investment frenzy starts. This will lead to an over-investment and a first crisis – an interim period of uncertainty. Once those insecurities are overcome, the paradigm reaches maturity stage. In this stage, all innovations made before are becoming fully relevant on a societal scale. This is the roll-out phase of the paradigm, when knowledge about new business processes and new patterns of behavior gets widely shared. Once this is achieved, however, the benefits of the new technologies, new business models, new ways of working, start to decrease. Since everybody now knows how to do it, the competitive advantage is gone, and the paradigm enters its fourth and last stage, saturation.

The key point, however, that Perez makes, is that during maturation and especially during saturation phase aspects of a new paradigm are already developed, albeit not yet widely recognized. While the benefits of the existing paradigm can still be exploited, something new is already breeding under the surface. At this stage, however, it is hard to say what the new paradigm will really be made of.

It needs to be pointed out the theories about techno-economic paradigms have serious weaknesses. They imply a quite mechanistic way of historical development and as such, suggest a depoliticized view of history. History is always defined through human struggles which have many aspects, be they of a political, cultural or religious kind. Work under the title *Technopolitics*, initially undertaken by Brian Holmes and Armin Medosch, meanwhile more widely shared by a Technopolitics working group in Vienna, has widened the scope and perspective to not just look at techno-economic but also techno-political paradigms. History is not only defined by economics and technology, but also by politics, which implies raising the fundamental question how we want to live, as individuals and as social groups or classes.

The economic innovation school appears to almost willfully exclude such a political perspective, implicitly suggesting that capitalism itself will continue forever, in one way or the other. But as recent years have shown, the struggle is exactly also about that aspect of the argument, with new social movements in the European and global South suggesting a different type of economic model, often based on commons-types of economic activity where cooperation plays a larger role than competition.

It is now not so difficult to apply those theoretic concepts to recent history. According to Freeman, Perez, and other scholars, the fourth long-cycle had been defined by the industrial mass production of consumer goods, in particular cars, by communications technologies such as radio and television (which relied on a centralized *broadcast* structure) and on cheap energy based on oil and other fossil fuels and nuclear energy. This paradigm reached maturity during the first decades after the Second World War, when it allowed for a long boom of economic expansion, led by the United States. It was successfully copied by nations who had been defeated in that war but now had become the biggest American allies, Germany and Japan, as well as other states in Europe. This industrial paradigm is often referred to as Fordism, after Henry Ford, who invented the core production technology supporting it, the assembly line.

However, it is very important to point out that this paradigm also had an economic and political aspect. Because of the economic, political, or simply human catastrophes of the first half of the 20th century and because of the existence of the Soviet Union proposing itself to be an alternative socio-political model, capital was willing to compromise and find a way of co-existence with labor. This manifested itself in concessions to organized labor, such as the right to form trade unions and the agreement to collective bargaining. These institutional arrangements guaranteed rising wages and rising living standards in the USA, Western Europe, and Japan for 25 years. In the 1970s, however, for a combination of reasons this model entered a crisis, and the new techno-political paradigm, the *information society* began, at first under the surface of what was then called *Post-Fordism*.

The 1970s were a period of crisis and transition, when the new paradigm had been kickstarted by the mass production of microprocessors by Intel in 1970-71 making computing small and cheap. This was at first only recognized by an avant-garde of techies, intellectuals, financiers, people who met, for instance, in the Homebrew Computer Club, or worked in research labs such as Xerox Park, where the first GUI was created. Yet by the end of that decade, the first Personal Computers (PCs) were brought to market, and the electronic and digital world started to capture popular imagination through video games and films such as Tron. Now, rather than continuing with such a chronological narrative, I would like to point out that by the early 1990s, the information society was established, and with the opening of the internet, an investment frenzy started, at the time known as the New Economy. It first hit the headlines of newspapers globally, when the browser company Netscape received two billion dollars for its initial public offering (IPO) at the stock market.

When we now take a look at the old paradigm, Fordism, and the new paradigm, information society or *informationalism*, we can see that in many aspects it has turned to completely the opposite of what had been in place before. Had the old paradigm depended on hierarchical chains of command from top down to the bottom, the new paradigm fostered much flatter hierarchies and cooperation. This found its most pronounced expression in the leading sector, ICT (Information and Communications Technology), where *commons-based peer production* became the new norm. This term, coined by Yochai Benkler, suggests a new cooperative type of production, pioneered in free and open source software.[[5]](#footnote-5) People decide themselves on which projects they want to work and freely associate themselves with software projects. These projects are then often not organized in a completely egalitarian way, sometimes there are so called benevolent dictatorships. But the core issue is that it is free cooperation and that the results of that cooperation are entering a digital commons, a pool of resources which can in principle be used by all.

I could continue now with a much longer list of transitions from the old to the new paradigm, but would rather restrict it to a few core examples. Another important point is the type of media used. Fordism relied on a centralized model of broadcast media, with electronic media such as radio and television sending out their messages to people. *Feedback* was provided mainly through viewer statistics but also focus groups used in product marketing. The informational paradigm is characterized by *pull*-type media, where people either communicate with each other directly, through the internet, or use *on demand* platforms to watch what they want, when and where they want it. This would seem in principle to foster a much more egalitarian media culture, a *read and write* media culture, as Lawrence Lessig, advocate of the Creative Commons licenses for free content, has called it.[[6]](#footnote-6)

The problem at which I wanted to get through this rather lengthy parenthesis is that all those great ideas and innovations have somehow become stuck halfway. It is true that in principle free cooperation has become much more important than hierarchical top-down structures. However, hierarchies have not gone away, and command structures have become established on another level. It is true that the combination of cheap computing power, laptops, and the Net has enabled a much more egalitarian media culture. At the same time, however, new centralized media powers have arisen which did not even exist 20 years ago, companies such as Google and Facebook who have acquired a centrality compared to which Henry Ford's business empire pales.

One aspect of this paradigm change which has not been mentioned yet, must be added quickly, which is *financialization* and *neoliberalism*. Finalization describes a process where ever more areas of the economy were reshaped according to principles stemming from high finance and finding their most potent expression in computerized, networked stock markets. This means that even companies who on the surface still mass-produce consumer goods, now act according to a new set of principles. While in the old paradigm, the Fordist multinational corporation had been hierarchically organized, subsuming under one company all kinds of activities – development, production, marketing, catering, cleaning – in the financialized economies of now, corporations have been broken up and shed all those parts which do not promise a maximum of profit. Production typically happens abroad, in so called low-wage countries, while things such as cleaning or catering or transport and logistics are outsourced to companies exposed to breakneck competition.

This system has arisen in tandem with the neoliberal economy. We can say that while financialization is the *mode of production* of the information society, neoliberalism is its political ideology. It suggests as the best way forward a scaling down of the state and its functions, while everything should be ruled by market mechanisms. This, it needs to be said, is an ideology. The reality is different. In neoliberalism, the markets are not free and the states have an important function, but this is rarely ever said. Neoliberalism is now the ruling ideology and as such, it does not have to care about reality. It has won the argument, at least as far as business circles and politicians are concerned, and as a consequence, many rights and achievements of the labor movement have been rolled back. This has led to a much more uneven economic development, with a rising gap between rich and poor. Even the OECD, which itself is a kind of neoliberal think tank of the most developed countries has recently conceded that never before has income inequality been as pronounced as now.

As a result, the paradigm shift has remained incomplete. As Karl Marx and Friedrich Engels had already observed in the mid 19th century, capitalism is technologically innovative. This would create the condition which would theoretically enable a new type of society. The informational paradigm has this potential to enable a knowledge society, a cultural society, where sharing, learning, and the creative realization of the self become core aims. These beneficial aspects and potentials of the liberal technological utopia are constantly undermined by capitalism’s need to maintain current social relations. It has to catch the surplus amount of freedom in order to maintain the political status quo. Thus, you have *Störerhaftung*, data retention laws, surveillance, Big Data, the rule of the financial markets, the command of capital.

The bigger sweep of history shows that there is a structural analogy between the distributed or decentralized structure of the Net and the ideals of the revolutionary sixties. The global revolts of ‘68 were against the docility induced by one-directional, one-dimensional societies of mass production, where TV organized the consciousness of the worker-consumers. The drive for decentralization has come from many corners, but has its origins in the social movements of the 1960s. The foundational technologies of the internet were developed in the late 1960s, by staff and students at public universities, who made the results of their research public, thus creating the foundations of the digital commons. Inspired administrators such as J.C.R. Licklider were driven by visions of networked digital public libraries.[[7]](#footnote-7)

The information society has inherited those ethical values which have also become embodied in the structure of digital technologies in general and the internet in particular. From this point of view, the Net as it exists today is a mesh network, and it is free and neutral, at least on the level of protocols, as I have written in the first chapter. The information society as such, however, has only been established in core nations in the 1980s and 1990s, and not everyone loves its decentralizing, horizontal, participatory groove. So there are those continuing tensions and contradictions going on, between those forces who still defend their privileges and sources of incomes, but also patterns of thought of the old paradigm, and those who propagate bottom up social self-organization and a free culture of sharing and cooperation. Advocates of free culture need to be careful, however, not to become victims of their own ideology.

As this article on Rhizome[[8]](#footnote-8) has pointed out, there is a connection between mesh networking and decentralization in general, but this opens the danger of a re-centralization. In an article in 2004, I speculated about similar issues, regarding a *Society in Ad-hoc Mode*. We have to be careful not to be carried away too much by those technological and political analogies. A mesh network can also be used by the army. Well, the first mobile ad-hoc networks were developed by the US army. The social version of the ad-hoc mode may have liberating potentials, but we do not need to forget that neoliberalism is the political economy of informationalism, and that means that ever more areas are exposed to financialization. The plutocracy of global finance prefers *ad-hoc* structures such as the G7/8/20 conferences. They like them, rather than more democratically legitimate structures such as the UNO. Globally important decisions are made by ad-hoc committees rather than more democratically legitimized multinational structures. The allocation of the means of social production – and that is what finance is[[9]](#footnote-9) – is regulated by stock markets which are increasingly networked and automated, rather than by considerations about the well-being of people, animals, plants and the sustainability of natural resources. Decentralization can become a dangerous ideology when detached from actual social content. On a political layer, it is then either a form of libertarianism or anarchism.

The negative effects of financially driven globalization have been countered by new global protest movements that emerged as a specific new political culture of the Net in the 1990s. As the old class politics were replaced by a newly constituted *working class*, which has become rechristened as the *multitudes*, new forms of networked protest were pioneered in the 1990s. With support of the Association for Progressive Communications[[10]](#footnote-10) during the Chiapas uprising in 1994, messages from Subcommandante Marco were smuggled out of the Lacandona jungle via the Net and triggered a global campaign of solidarity which stopped the Mexican army from committing genocide against the descendants of the Maya people.

The increasing financialization during the era of the New Economy peaked in protests against the financial centers and free trade such as June 18th and the Battle of Seattle in 1999. The multitudes got together on the streets, organized in a decentralized way, via the Net. It is no coincidence that June 18th and Seattle were foundational moments for Indymedia. However, those were early high-points of a new form of networked protest that has received various names, from the Arab Spring to the Indignados to Occupy – movements for the right to democratic self-organization supported by a variety of DIY network technologies.

All major protests against G7/8 meetings after Seattle had independent media centers, IMCs, which in some cases were attacked by the police. Ad-hoc networks for mobile devices carried by crowds could make uncensored communications possible, even when mobile phone networks are shut off. The ad-hoc mode, the power of self-organization has become part of a wider epistemological shift in the information society. Starting in the 1980s, but intensifying in the 90s, there was a flood of terms such as *emergence*, *complexity*, *self-organization*, which were spilling over from techno-science into common language. These are all terms which come from a second order cybernetics, the cybernetics of cybernetics, and form an epistemological framework for the network society. In some cases they have become mixed with other terms from the social sciences and philosophy, such as *spaces of flow* and *lines of flight*. In some cases this is just old-fashioned philosophical idealism in a new dress-up. In the worst case, this can become part of an ideology, where neoliberalism, libertarianism (or anarchism), high-tech and finance meet to create new ideologies of power and domination, for which the best example is still Kevin Kelly’s book *Out of Control*.[[11]](#footnote-11)

Against this backdrop, I have advocated, already years ago, a political understanding of the term *self-organization*. One of the few coherent concepts for self-organization was developed by the philosopher, psychoanalyst and political activist Cornelius Castoriadis.[[12]](#footnote-12)

Castoriadis’ ideas center on autonomy (self-determination) as opposed to heteronomy (outside control). In his view, self-organization is not simply a better model for organization or management, serving instead as a principle for ‘the permanent and explicit self-institution of society; that is to say, a state in which the collectivity knows that its institutions are its own creation and has become capable of regarding them as such, of taking them up again and transforming them.’[[13]](#footnote-13) Castoriadis went back to the direct democracy of the Greek city state in order to find out how democracy should reinvent itself today. This vision could also be achieved by using self-organizing technologies such as mesh networks. What is dangerous, however, is any belief that automatically links the technological with the social level of self-organisation.

The protest movements of the late 1990s and the concepts and ideas of free software have inspired new ideas regarding the possibility of self-organization. In the 1990s, this has led to a lively discourse, first, about the digital commons, then about the notion of the commons in general. The rise of the information society enabled an avant-garde of software developers to create the digital commons. As I have described in much more detail in my article *Shockwaves in the New World Order of Information and Communication*[[14]](#footnote-14) the success of the digital commons has then been transposed into other areas. People such as Michel Bauwens of the Peer-2-Peer Foundation are propagating the idea of the commons as a new social model that could be applied in all areas. After the financial crash of 2008, the commons movement internationally has taken up steam. Electoral victories by protest movements in Greece and Spain signal, that a political change has started which could lead not just to a new techno-economic but also to a different political paradigm in which the commons and social justice play a greater role.

While I do not insinuate that every member of the free network movements shares leftist political ideas, I propose to consider such a larger socio-economic environment. The self-organizing mesh network could thrive much better in a self-organizing society. Currently we live in an ongoing era of insecurity. The new paradigm is not yet in sight, its shape remains to be determined. I think that, without this being a foregone conclusion, commons of all types, technological, social, political, could play a much greater role in the next 25 years, while at the same time we need to be cautious regarding the ideology of the information society which has made a language of self-organization, emergence and complexity its own, while actually building new hierarchies and new forms of domination and repression.

## 6.1 Comment: Brian Holmes: The Long-Awaited Shift is not the Paradigm

Armin, you are a very strict guy when it comes to concepts. From my view that's fantastic and I think you should go a little further with it.

If we are talking *techno-political paradigms*, the informational shift happened, and it was complete. From the 90s onward (with significant precedents in the US a decade before) network technologies under strong corporate and state control provided the communicational glue for a new organizational form that was able to reorganize production on continental and global scales. Of course, financialization represents a speculative excess over global just-in-time organization. But finance has also been a key enabling component of the informational production paradigm. The capacity to raise money on capital markets and use it to create new industrial plants, extractive operations, and distribution chains, all in record time, has been the excruciating history of the last three decades. Finance allowed IT to become productive. The results have built a new Asia.

What has not yet happened is any perceptible shift in the overall mode of development. Yet what your text is about (this chapter, and the whole book) is precisely the emergence, in nuce, of a cooperative mode of development in the key sector of the neoliberal production paradigm, which is obviously information technology. That's the amazing thing. Just as mechanical engineers in the 1910s and 20s were widely seen as progressive, even revolutionary social agents, so software engineers, with their open source coding, have been and still are seen as potentially revolutionary social agents in our time.

What has been missing up to now, in my view, has been the capacity for the cooperative mode of symbolic code creation to organize forms of material production that can be concretely useful to everyday life, beyond the realm of images and signs. The factory mode of production brought many new use values into being, for all social classes. Informational production has thus far remained under the control of the corporations and the state. They dictated its major forms. The paradigm shift was for them.

Yet probably in the time I have been writing this, solar panels have gotten cheaper. Certainly their cost has plummeted over the last five years. We know from the history of techno-politics that a change in energy source is a major change indeed (cf. the book *Carbon Democracy*,[[15]](#footnote-15) a fundamental book for all that interests us). Solar panels become socially progressive in the context of decentralized smart grids, and even more so when they are used to power micro-manufacturing technologies. Under normal circumstances, these are the kinds of techno-political transformations that capitalist oligopolies would do everything possible to suppress (call it the *Tesla syndrome*). Today they are still trying to do that, with the big guns of oil and nuclear power. But climate change, runaway automation and an exponentially increasing global population are not normal circumstances. Unprecedented numbers of people need to survive and thrive in a way that does not constitute a path toward collective suicide. Solar panels, windmills and decentralized micro-manufacturing have a real chance over the next long wave.

Every forty to fifty years, capitalism completes a paradigm shift. Great news for the capitalists! Or to hell with them, I say. Now, as in the 20s and 30s of the last century, what we can struggle for is something far more beneficial. A change in the mode of development itself.

1. Thomas S. Kuhn, *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962. [↑](#footnote-ref-1)
2. Christopher Freeman and Luc Soete, *The Economics of Industrial Innovation*. 3rd revised. Cambridge Mass.: MIT Press, 1997. [↑](#footnote-ref-2)
3. Joshua S. Goldstein, *Long Cycles: Prosperity and War in the Modern Age*. New Haven: Yale University Press, 1988. [↑](#footnote-ref-3)
4. Carlota Perez, *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Cheltenham, UK; Northampton, MA, USA: Edward Elgar Publishing, 2002. [↑](#footnote-ref-4)
5. Yochai Benkler, *The Wealth of Networks : How Social Production Transforms Markets and Freedom*. New Haven, Conn.: Yale University Press, 2006. [↑](#footnote-ref-5)
6. Lawrence Lessig, *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity*. London: Penguin Books, 2004. [↑](#footnote-ref-6)
7. Morris Mitchell Waldrop, *The Dream Machine : J. C. R. Licklider and the Revolution that Made Computing Personal*. New York: Penguin Books, 2002. [↑](#footnote-ref-7)
8. Adam Rothstein, ‘Making Internet Local’, Rhizome, 06 November 2014, https://rhizome.org/editorial/2014/nov/6/making-internet-local-mesh-network/. [↑](#footnote-ref-8)
9. Saskia Sassen, ‘Finance as Capability: Good, Bad, Dangerous’, *Arcade,* 2014, https://web.archive.org/web/20150620143536/http://arcade.stanford.edu/occasion/finance-capability-good-bad-dangerous. [↑](#footnote-ref-9)
10. Association for Progressive Communications, https://www.apc.org/. [↑](#footnote-ref-10)
11. Kevin Kelly, *Out of Control: The New Biology of Machines, Social Systems & the Economic World*. New York: Basic Books, 1995. [↑](#footnote-ref-11)
12. Cornelius Castoriadis took part in the attempted Communist coup in Greece in 1944. This experience turned him into an opponent of Stalinism and he went to France, where he joined the Trotskyites, soon leaving again due to their authoritarian tendencies. He then founded the group *Socialisme ou barbarie* and the publication of the same name. In his work with this group, he developed his ideas of self-organization, using the example of wildcat strikes, among others. He was one of the first radical socialists in France at the time to publicly criticize Stalinism, as well as publishing critiques of Marx’s historical determinism. [↑](#footnote-ref-12)
13. Cornelius Castoriadis, *The Castoriadis Reader*. Oxford; Cambridge, Mass.: Blackwell Publishers, 1997, p. 30. [↑](#footnote-ref-13)
14. Christiane Paul (ed.) *A Companion to Digital Art*, Hoboken, NJ: Wiley-Blackwell, 2016, pp. 353-383. [↑](#footnote-ref-14)
15. Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil*, Verso, 2011. [↑](#footnote-ref-15)