THE HYPOTHESIS OF THE END OF THE INTERNET REVOLUTION

by

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PREREQUISITES [1]

I will use four theoretical sources in this paper: two constructivist approaches developed within sociology of technology during 1980' (namely Actor-Network Theory and Theory of Large Technological Systems); my previous analyses of the process of social construction of the Internet technology; and Manuel Castells' analyses of social effects of information technologies.

First of all, the fact that the Internet revolution has taken place is *sine qua non* of this paper – we will only question here whether this revolution is still developing or just finishing. I am not going to argue here for what I consider to be a fact – convincing arguments can be found for example in the late work of Manuel Castells.[1]

The second step is to clarify what I mean by the term "the Internet revolution". Generally, the word revolution refers to relatively sudden changes that mark a discontinuity between two substantially different time periods. These changes must be somehow radical; in other words, they must represent a change in those principal characteristics of respective periods that are crucial for their historical identity. Here we are interested in the Internet revolution, so the question is what to take as a general definitional criterion that helps us to date this process. In general, the common denominator of most projections and reflections of computer networks diffusion is

[1] Castells understands the Internet evolution as a key part of information technologies revolution "because communication is the essence of human activity" and the Internet transforms the topology of social interaction and organization (Castells 2000, 2001).

a substantial transformation of common patterns of social interaction and organization manifesting itself in various forms in all affected spheres of human activities. [2]

The third step in understanding conceptual foundations of proposed hypothesis is to realise that there is no social without technical and no technical without social in the real world – these two realms become divided only in abstract reflections that are therefore unable to grasp and understand issues that lay across their artificial boundary (for example power aspects of technologies). One of the key problems in understanding issue in question is that distinction splitting technology and social action is strongly rooted in the way we understand social processes.

THEORIES [2]

Very inspiring and fruitful solution for this problem can be found in actor-network theory (ANT). Being influenced by the work of Michel Foucault and by French poststructuralist tradition in general, authors such as Michel Callon, Bruno Latour and John Law (to name only the key ones) developed specific radical constructivist theory during 1980' to bridge the analytical gap between people and technology.

Simply said, in actor-network theory a construction of any artefact[3] is understood as a process of forming and interlinking network of heterogeneous elements by another network of heterogeneous elements. These elements can be people, technologies, texts, buildings, and so on… People's choice is not necessarily decisive in an actor-network because *behavior* of every element (and it means also people) is limited by another elements in the network. Therefore, all elements are seen as active participants on network's dynamics from actor-network theory perspective. Whether a vision will be successfully realized or not depends on ability (1) to identify significant elements and to define correctly their relationships within constructed actor-network, (2) to successfully remove, substitute or incorporate those parts that resist their anticipated *behavior* during the construction, and

[2] The concrete content of the term "the Internet revolution" that I cope here with is grounded in a historically specific (mostly techno deterministic) set of expectations that originated in the sphere of practice of the Internet construction and development (Castells 2001: 36-61; Fisher, Wright 2001; Lévy 2000; Licklider, Taylor 1968).

[3] According to basic precondition of this approach, an artefact cannot be understood as purely technological – it could be also a text, an enterprise, and the like.

(3) to preserve a definitional control over whole process.[4] Every element included in a project represents strongly simplified networks of heterogeneous elements that are also parts of other actor-networks – for example manufacturing and distributive organizations, research institutes, produced technologies, relevant markets, actors providing resources needed for successful accomplishing of a project, etc. " Each modification thus affects not only the elements of the actor network and their relationships but also the networks simplified by each of these elements."[5] The cornerstone here is that with a furthering of radical technology designers concurrently try to restructure respective parts of society.[6] Therefore, authors applying actor-network theory are not interested in relationship between technology and society but are focused on the ways in which sociotechnologies are envisioned, constructed, pushed in certain direction by certain actors and stabilized as historically specific irreversible sociotechnical arrangements.

The basic qualities of actor-network theory were partly utilised by historian Thomas Parke Hughes in his theory of large technological systems[7] where he utilized his former studies[8] about development and dynamics of large technological complexes of the second half of the 19th and the first half of the 20th century.

Technological systems contain complex, problem-solving heterogeneous components,[9] not only norms, values or communication as it is in already classic sociological system theories. In the case of the Internet the elements would be computers; cables; modems; satellites; software; network protocols; Internet service/content providers; relevant manufacturing or managing organizations; relevant users; technical standards; regulatory laws; open-source movement; manuals; and so on. Large technological systems differ from technological systems in size and level of complexity. Be it for example road, railway, air or sea transport systems; oil production and distribution system or electric light and power systems, they act upon all levels of modern societies with an immense force – they (1) form framework of so-

4 Callon and Law (1997)
5 Callon (1993: 96).
6 From this point of view technological development becomes a political issue.
7 Hughes (1993).
8 For example Hughes (1969, 1983).
9 Hughes (1993: 54).

cial action possibilities, (2) they condition certain forms of organization and management and (3) represent inseparable component of economies and policies of macro social formations (states, large corporations). Because they are sociotechnical complexes, their construction also means changes in entire segments of affected societies. For this reason they also represent a rich source of power.

According to Thomas Hughes "the history of evolving, or expanding, systems can be presented in the phases in which the activity named predominates: invention, development, innovation, transfer, and growth, competition and consolidation "[10]. Phases in history of a concrete technological system do not simply follow this order because every technological system develops with a different structure in a different environment.

PARALLELS [3]

In the year 2000 Hughes presented a lecture "Industrial Revolutions: From Canal Systems to Computer Networks"[11] where he sketched basic parallels between the Industrial and the Information revolutions. His main aim was to argue that the Information revolution really took place and that there are some key structural similarities among these revolutions. According to these similarities the industrial revolutions of the last thirds of 18th and 19th century can be schematically divided into three subsequent stages:

1. A relatively short phase in which radical – core – innovation is introduced, developed and stabilized in a form of simple technological system. According to Castells and Hughes,[12] corresponding innovations here are steam engine and technology of generation and distribution of electricity because only through these innovations other technological fields could interact and develop their applications. In this phase experimental technological system is constructed around the innovation.
2. Then, mutual interactions with an old sociotechnological arrangement lead to new innovations and to the structural changes in all interacting systems. Further development and expansion of a new system is accompanied

[10] Hughes (1993: 56).
[11] Hughes (2000)
[12] Castells (2000: 37-38), Hughes (2000)

by an introduction of new forms of organization and management.[13]
3. The third is the stage of sociotechnical stabilization. Innovative efforts of already large technological system are oriented towards its consolidation and growth therefore refusing every internal radical (structural) change. In this stage, stable dynamics of large technological systems' development and conservative nature of innovations lay the foundations of consistent and historically bounded arrangement later labelled 'the Industrial Society'.

If we consider this to be a model for the process of the Internet revolution, we should expect a stabilization of certain organizational pattern that would be specific for informationalized segments of societies.

APPLICATION [4]

According to presented schema I will simplify the development of the Internet by dividing it into three phases: an innovation phase, a phase of interpenetration and a phase of stabilization. The history of the Internet as a technological system would then reveal in what stage Internet is and what to expect from following Internet development in general.

THE INNOVATION PHASE [4.1]

In the innovation phase the invention develops from simple actor-network, existing only in mind of an inventor, into a simple system that is stabilized under small-scale experimental conditions.

Thomas Hughes distinguishes two basic types of innovations – radical and conservative. Conservative innovations are oriented towards increasing efficiency, deepening integrity or broadening the sphere of activity of already constructed system. The term radical innovation does not refer to some momentous social effects, as it may seem on the first sight, but to an incompatibility with existing technological systems. Also it would be an erroneous assumption that every radical innovation automatically constitutes a new technological system; it can also end up in a dead end. "Because radical innovations do not contribute to the growth of existing technological

[13] Compare for example with effects of a railway system and a telegraph system expansion on introduction of new methods of managing large-scale companies (Gokalp 1992: 61-62); in a similar way Hughes' (1983, 1993, 2000) analyses of new methods of managing large-scale electrical utilities and new managerial methods (Fordism and Taylorism), representing hallmark of the Second Industrial Revolution.

systems, which are presided over by, systematically linked to, and financially supported by larger entities, organizations rarely nurture a radical invention."[14]

The first experimental computer network ARPANET has been developed for about twenty years under the protection of the Advanced Research Projects Agency (the government agency of the US). Financing of technology that was strongly incompatible with the large technological system of telecommunications and had no real possibility of practical application (!) was being refused by all private companies for a long time. At that time its development was protected by a collective effort of relatively small group of computer enthusiasts who believed that only realization and diffusion of computer networks could lead to a better world without social deprivation and unemployment[15]. The idea that positive social effects can be achieved by mere diffusion of computer networks has always been integral part of construction of the actor-network of global computer network technology.[16]

A dynamic horizontal network soon crystallized as an organizational form of the ARPANET system. It accelerated development of the whole system by communication of recognized problems in a real-time through the system and by increasing efficiency of the innovation process by open peer-review of technical specifications and proposals.

The ARPANET has become well stabilized due to sufficiently long isolation from a "real" environment – during the Internet construction the specific ARPANET way of solving problems of interconnecting different computational entities was fruitfully used up.[17]

THE PHASE OF INTERPENETRATION [4.2]

In the second phase the new system crosses the borders of experimental conditions and must face the necessity of incorporating increasing number of various factors and new elements. The more fundamental the incompatibility of the new system and an old arrangement is, the deeper are changes that both new and old technological systems go through. Because large

[14] Hughes (1993: 57-58).
[15] Licklider and Taylor (1968).
[16] See Huitema (1996), Cerf (2001).
[17] Lupac (2005: 86-87)

technological systems are entrenched in numerous spheres of human activity, the emergence and expansion of a new technological system leads to conflicts among social groups that are linked by their interests to the development of these systems.[18] These conflicts become a main source of problematization of following development in competing systems. The "battle" of similarly powerful systems usually none of them wins - the most common stabilization process occurring in this situation is, as T. Hughes calls it, a "symmetrical amortization of vested interests". The battle between Internet technological system and the international telecommunication regime[19] for globally used network protocol could serve as an example of competition between large technological systems.[20]

Expansion of the system leads to the growth of its political and economical importance thereby increasing demand for system's stable growth. On the other side, adjusting the system substantially to its environment influences its capability to cause the structural transformation in impacted parts of society.

From the impact of the Internet development on emerging organizational innovations can be inferred that the interpenetration phase lasted approximately since the turn of the 70′ and 80′ to the first half of this decade. During that period the Internet interpenetrated with all other systems of mass and interpersonal communication, eroded their stabilized sociotechnical structures and conditioned their subsequent restructuring. At the same time problems of expected development of the Internet were defined by economical, political, legal and other relevant actors that influenced the courses of innovation trajectories of system components.[21] The extent, *to* which the interactions between the Internet and its environment transformed the sociotechnical structure of the Internet, depended on two main factors:

I. On the ability to physically separate part of the Internet and to control exclusively the obligatory point of passage between separated networks. This

[18] Simply said the nature and extent of following changes in affected systems is given by the proportion of powers of competing social groups.

[19] Technological solutions that were more suitable for their interests were adopted and promoted by governments of economically developed countries, government agencies, telecommunication enterprises, the International Telecommunication Union and ISO – the International Organization for Standardization.

[20] For more details see Castells (2001: 26-32); Cerf (2001: 34-36); Hafner and Lyon (1998: 246-248); Leib and Werle (2000).

[21] Lupac (2005).

strategy prevailed in the utilization of the Internet technology by private companies[22], for political subjects we could name Chinese efforts[23].
II. On investment power to add a new component or to implement structural changes in whole system. *This could be exemplified by the* mass media system pushing investments towards so called infotainment[24], or e-business companies investing in technologies of control of information flows as a guaranty of safe virtual transactions[25].

Once the crucial parts of these changes are accomplished and interacting systems functionally integrated, innovation efforts turn back to solving problems of consolidation and stabilization in their respective subsystems.

THE PHASE OF STABILIZATION [4.3]

Once the Internet started the process of interpenetration with the whole body of society, it was destined to become one of basic cornerstones of transformed sociotechnical arrangement (stabilization of a system structure does not mean an absence of development and growth!). Such a development was not necessarily inevitable – Hughes criticizes the notion of autonomy of technological proliferation[26] by stressing that sociotechnological juggernauts are kept in motion by huge mass of actors that are bounded to them by their habits and interests. Corporations, governments, a great number of small service and developer companies, commercial and government research laboratories, investment companies and banks, universities, social movements, all common users for which the Internet represents a part of their everyday life – all of these actors support by their everyday action the technological system of the Internet in its slowing development. Because every large technological system is also a complex of socially valuable resources and strategically utilizable sources of uncertainty, every radical change is a hypothetical threat for too many embedded interests and power strategies. The more complex and socially entrenched a large technological system is, the less the chance of any deeper transformation of this system is and the tinier the chance to influence the growth or structure of the whole system

[22] Castells (2001), Huitema (1998).
[23] Qiu (2004).
[24] Castells (2000: 394-402).
[25] Castells (2001: 168-182).
[26] See Ellul (1980), Ogburn (1964).

from one concrete strategic position is. For example, for more than ten years there have been discussions to substitute the key technical part of the Internet technological system – the Internet protocol version 4. In its actual, yet not applied form, it represents an answer for problems of all main actors that now define the course of the Internet development – governments, e-business and massmedia actors … and Internet protocol engineers that still fulfil their mission to interconnect everything digital. This innovation can be interpreted in many ways, but certainly not as a radical innovation bringing social effects that were originally expected from the diffusion of the Internet.

At this point an interesting question arises: which general patterns of sociotechnical relations represent what could be called the „core sociotechnological structure" of the Internet (the stabilized basic structure that do not change). We can find an *exemplary* answer for this question in the late work of the famous sociologist and economist Manuel Castells, namely in his conception "network enterprise". Castells shows the emergence of a new organizational model that arises on the intersection of main trends of organizational change and so far relatively independently evolving systems of computer mediated communication. This model – the network enterprise – is represented by instrumental ad-hoc networking of manufacturing and distributive networks that is coordinated by core network due to high capacity of information processing and real-time feedback. Castells argues that this model has been spreading quickly since 1990' due to its high competitiveness and flexibility in comparison to traditional model of vertically organized corporation.[27]

The question for further examination might be, what other social forms are also being stabilized as an effect of the Internet stabilization? For example there might be also used Castells' analyses of changes in sociability patterns.

So the stabilization of the basic structure of the Internet with all its related consequences can be inferred not only theoretically from structural similarities with industrial revolutions or from overwhelming embodiment of the Internet in numerous spheres of human activities, but also from empirically grounded conceptions that do not share the same set of methodological tools (here specifically the sociology of organization). For sociological

[27] For more detail, see Castells (2000: 163-188).

theory the statement of the end of the Internet revolution implies the request to throw out all conceptions that were linked to those histories in which the Internet Revolution had to come in the near future changing drastically the structure of societies we live in. If there comes any radical social change through the Internet, it will be a change performed by certain social movement, not by technological system that would serve in such a situation only as an organizational and communication infrastructure for struggling social entities. That is because the Internet revolution has already taken place.

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