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Ulrich Dolata

Wandel durch Technik. Eine Theorie soziotechnischer Transformation

(Change by means of technology: A theory of sociotechnological transformation)

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The face of modern society is determined not only by the technologies that we use but also by the changes that they undergo. Our lives have been marked by cars for a century but the digital revolution is now changing them more than any social movement has ever been able to do. However, it is not doing so for everybody in the same way. Technology changes the world but changes it differently for every person, because the world in which we live is never the *same* world for every individual. The example of digital technology is enlightening in this regard. In the past thirty years, the array of correlated and complementary technological innovations known as the Internet has produced conspicuous changes for human beings. But these changes have not been equally radical in all spheres of life. Consider two spheres which are substantially different: the manufacture of automobiles and the production of music (but also its consumption).

The entry of Internet into automobile manufacture has brought changes in, for example, the circulation of information between the manufacturer and its suppliers, or between the manufacturer and its sales network. In an era of the large-scale relocation of production and the massive spread of outsourcing, the Internet has become a crucial resource for the operation of the automotive industry. But, despite its enormous impact, the Internet has not provoked radical transformations in the sector. Instead, it has become an important tool with which to support the car industry's existing organizational, institutional, and structural bases.

Something very different has occurred in the field of music production. Until the end of the 1990s the sector was dominated, from the technological point of view, by the compact disc. Because this device was not easily duplicated, it

guaranteed substantial monopoly for a group of five global players. But the propagation of the Internet and the diffusion of new systems of data compression like MP3 have had disruptive socio-economic consequences for the music industry, its actors and institutions. The consumption of music has shifted from hi-fi systems to the computer, from CDs to file-sharing, from a 'solid' activity (tied to places, objects, costs) to a 'fluid' one (without any material constraint). On the production side, this has revolutionized the landscape of economic actors and legal rules (contracts, copyright). On the distribution side, this technological revolution has led to the disappearance of a large number of actors (the majority of record stores) and the appearance of entirely new players in the online music business.

In short, the same technological innovation (Internet) has had wholly different effects on two distinct socio-economic sectors. In both cases it has induced renewal of the social and economic landscape, but in the car industry it has contributed to the survival and the strengthening of the old system of actors, organizations and institutions, whereas in the music industry it has provoked a revolution.

Comparison between these two cases prompts the following general consideration: technological innovation can be understood neither by relating it to society as a whole nor by considering technology in isolation from its contexts of application. This point must be understood, not in the sense – by now standard in the literature (Flichy 1995) – that is an error to consider social change deterministically as an effect of the technological innovation, or technological innovation as an effect of social change. Rather, it should be understood in the more specific sense that the social impact of a technological innovation is never uniform because it may vary substantially according to the socio-economic sector considered. Hence, it makes no sense to ask what the impact of the Internet has been on contemporary societies, because there has not been *one* repercussion.

This is the context from which Ulrich Dolata's book on technology-induced change springs. It breaks this change down into its technical and social components, and it reconstructs, on the basis of a series of empirical examples drawn from various socio-economic sectors, the multiple forms that it may assume. The aim of the book is not so much to develop a unitary theory of socio-technical change as to highlight the main variables on the basis of which it takes shape. These variables concern, not the type of innovation and its extent, but the inextricable interaction between a certain technical-material transformation and a particular social context undergoing change.

What, therefore, are these variables? Dolata identifies three of them: the force with which a technology penetrates a socio-economic sector; a socio-economic sector's capacity to adapt to technological changes; and the mutable gradual-

ness of the overall transformation according to the sector.

The *strength of technological penetration* (covered in chapter 4) indicates the capacity of an innovation to enter and proliferate in a certain socio-economic sector and follows from the fact that, when technologies enter or develop in that sector, they are not without consequences. That is to say, they do not simply integrate with the existing context of actors, organizations, and institutions but change it more or less radically. Now, this 'more or less' – such variability – derives from the fact that the intensity of penetration does not depend on the technology in itself but on the specific situation of its encounter with the socio-economic sector. A technological innovation will have greater strength of penetration, the more it is important for the reproduction of the sector in question, and the more resistant it is to inclusion within that sector's regulatory framework.

The *social capacity to adapt* to technological changes (covered in chapter 5) consists in how a sector and its actors come to terms with the new technological possibilities. Technological innovations create opportunities to open new markets, to introduce new forms of interaction, and to update a sector's normative. But if all this is done, and the way in which is done, are the outcomes of social processes which are triggered by the impact of technological innovation but not determined by it. Moreover, Dolata rightly does not consider a sector's capacity for adaptation to be merely adjustment to a given new technology, because technologies are never "given"; rather, they are the momentary result of a process of continuous transformation which from its embryonic stage onwards induces adaptive reactions in the socio-economic sectors in which it occurs. Technology 'in itself' is merely an idea that comes in handy for the simplifications of sociologists and journalists.

Finally, the *gradualness of transformations* (chapter 6), measures their progress in time. Every technological change is gradual; it does not happen through abrupt revolutions. Typically, a socio-economic sector moves through phases of discontinuity lasting a couple of decades, during which a new socio-technical paradigm replaces the previous one. Even the most radical innovations come about gradually, and there is no opposition between gradualness and radicalness in technology-driven change. Focusing on this aspect enables Dolota to investigate the broad space lying midway between the two extreme of persisting continuity and the sudden and radical revolutions. It is in this broad space that true change usually happens.

To avoid any misunderstandings, it should be pointed out that, when Dolata speaks of socio-economic sectors he is not referring to industrial sectors: He therefore does not embrace an economicist paradigm. Those sectors are indeed marked by a certain type of industrial

production, but they are characterized to an equal extent by other types of social actors: consumers, stakeholders of various kinds, political parties and public agencies, the media, research centres, associations of every sort. Clearly, the socio-economic sector of music coincides to only a minimum extent with the industrial sector of music production, and this applies to every other sector. These are instead organizational fields, in the sense given to the expression by Paul DiMaggio (DiMaggio and Powell 1983), characterized by specific regulatory patterns, actors' constellations, and forms of interaction. But they are also socio-technological sectors, because none of them could operate without its specific technical frame, which is not merely a derivative product but a crucial structuring factor. Overall, they are sectors governed by social structures and institutions which shape and delimit the choices of those belonging to them.

Dolata's argumentative style reveals a Kantian passion for lists, schemes and classifications which may irritate readers more attentive to nuances and, especially, more interested in dynamics, mechanisms, and causal relationships. Nevertheless, this approach enables Dolata to construct a good conceptual framework within which to analyze and understand socio-technical change, to make comparisons among similar or different phenomena, and to highlight the possible outcomes of ongoing transformations. The broad and documented use of empirical cases concerning socio-economic sectors affected by technology-induced change (particularly the automobile industry, pharmaceuticals, information technology, and music) gives factual solidity to the treatment which yields understanding of the concrete content of the abstract concepts presented.

Dolata teaches at the University of Stuttgart, but he originates from the Max-Planck Institut für Gesellschaftsforschung of Cologne, which in the past twenty years has produced, thanks to the work of Renate Mayntz and Raymund Werle, a large body of German research on technological innovation (see Dolata and Werle 2007). This is the cultural context of Dolata's new book, perhaps the first in which he systematically addresses the topic of technological innovation. In some respects, this cultural background is both a strength and a weakness of the book: a strength because it does not facilely imitate the best-known theoretical approaches in circulation; a weakness because at times the discourse seems extraneous to the lively international debate. I refer not only to discussion within STS but also, and especially to the sociological theory of recent decades. Some of Dolata's theses closely recall, by similarity or difference, the theories of Bourdieu, Hannerz or Latour, but without expressly interacting with them, so that it is left to the reader to reconstruct the overall picture. This, in fact, is a defect shared by many forms of

'applied' sociological inquiry. It has given rise to a proliferation of local and particularist studies whose contribution to the growth of knowledge is essentially restricted to transitory and contingent problems and situations, thus replicating, I submit, on a small scale what general sociology has already sustained on the large one.

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