Society – Technology – People

Theory-Interviews on the relationship between societal and technological change.

Interview with Prof. Dr. Uwe Schimank

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Where do we find sources for technological change and social division of labour?

If we look at how sociology has considered society, then there is, of course, a multitude of approaches. However, I would say that, upon closer inspection, this variety can be reduced to three and a half perspectives. These are, so to speak, theory families which display sufficient similarity with one another. The first is the theory of social differentiation. This is the perspective with which I began, and it is still the one to which I feel closest. Secondly, there is a sub-category of the theory of social differentiation—hence three and a half—namely capitalism theory, meaning the consideration of modern society as a capitalist society. Thirdly, of course, we have inequality theory. Like all societies, modern societies are marked by characteristic forms of inequality. And fourth, there is the adoption of a culture-theoretical perspective of modern society. Each of these perspectives certainly presents the question of drivers of technological development in a different way. However, rather than being contradictory, they complement one another in a certain way. And if we look at very specific technological developments, we will often see that the effect is caused by interplay between factors, let us say the differentiation theory combined with the culture theory or the inequality theory. I will start with the most obvious candidate, because it played a major role in the economic sciences in particular and in its considerations. I am speaking of capitalism. Usually, it’s referred to as the “market economy”, because “capitalism” is still seen as something of a battle cry / derogatory term (“Kampfbegriff”), so to say. But this is more of a German idiosyncrasy. People in the Anglo-Saxon world have no problem in talking about capitalism, even if they are not Marxists. Capitalism means an economy that is aligned towards profit and essentially has its basis in growth. This growth takes place via new production technologies, new organisational forms and new products. This growth is substantially founded in technological progress. Certainly since the industrial revolution, we can say that capitalism has become a social and economic form that is subject to increasing technologisation. The drivers in this process are for one thing the

efforts of companies to create new or better products so as to keep hold of customers in the face of competition and their endeavours to operate in a more cost-effective way. The latter may involve the optimisation of conveyor belt technology and other similar things. These are all well-known issues and they're right. Capitalism is a significant driver of a large number of technological developments and is not something that can be disregarded. Nevertheless, there are certainly technological developments which have their origin and sometimes even their main use not in the economic sphere, but instead—to name a more dubious driver—the military. Lots of technological developments have a military origin. They exist because of a desire to essentially optimise military technology. And this brings a very different societal sphere into play. Military technology mostly does not care about costs, for example. The aim is to defeat the enemy, no matter the price. So, the economy places great emphasis on efficiency, and efficiency is thus an important driver of technological development there. The military focuses primarily on effectiveness, i.e. on achieving the objective, no matter the price. Efficiency is incidental and has no part to play. This means that the type of technology designed on the basis of considerations which are primarily military is of a quite different nature to that conceptualised for economic reasons. In the latter case it is cost efficient, and in the former effective. And we all also know that spillovers have, of course, occurred. Technologies which were originally developed with a military reference proved to be useful in everyday life and even entered households. To this extent, there is certainly some truth to the old saying—which I believe is Greek—that war is the mother of invention. But, as soon as we speak of the military, we have implicitly already addressed a second theoretical social perspective, namely that of differentiation theory. From this perspective, modern society consists of an ensemble of about half a dozen individual spheres, one of which is the economy, which is dominating in some views, but it is not the only sphere. We also have things like the military, politics, law, education, science and a few other areas including intimate relations, or what we used to refer to as family. Nowadays family is just one special case within that sphere. We could now go through each of these spheres and look for where the drivers of certain technological developments lie. These may, for example, come from the educational or sports system, which is also a very interesting case in this regard. Or they could come from the large infrastructures operated by politics. I would say that we could find something wherever we look. Of course, the fact that contraceptive technologies are primarily directed at a purpose in the sphere of intimate relations does not mean that this is where they were developed. They were developed by pharmaceutical groups and by scientific research, two different spheres. These then worked together to create an offer, which was revealed to be useful in the sub-area of intimate relations and was then disseminated there. From a differentiation theory perspective, this means that very many technological developments ultimately have their roots in an interplay between several spheres. In modern society, this increasingly involves a combination between science and economy or science and military or other combinations. Science thus has a particular role within this ensemble, and we are able to say that technological development has been put on a scientific footing since the second half of the 19th century. Some think that the industrial revolution was driven by science, but this is wrong. Those who invented the crucial instruments of the revolution, the steam engine and other similar things, were tinkerers rather than scientists. They were, so to speak, precursors of engineering. The culture theory perspective is also very interesting. I would say that modern society is

characterised by a central guiding value in cultural terms, that guiding value being the shaping of progress. Modern society wishes to improve itself. The idea is that tomorrow should be better than today. Society aims to achieve this by itself and not leave matters to faith or place their hope in God. Human-made progress is the objective. Of course, the question “What actually is progress?” is normative in nature. This means that there are constant disputes everywhere as to whether the Pill represents progress or destroys tradition. And so forth. But we need to see that there are people who view certain technological developments as progress and thus place their faith in such developments. This means that belief in progress is also a major driver. But there is also an anti-pole to this in modern society. I will refer to this in exaggerated form as technophobia. The fear is that certain technologies being developed will cause more harm. People sometimes even fear damage of apocalyptic proportions, believing that it is better to not pursue a certain direction. There are also cultural moments which act as a brake. #00:09:52-1#

Who is driving technological change and social division of labour?

There are three ways in which certain technologies came to be. One is: you have a specific problem and you want to solve it better or at all. You think about possible technical solutions to this problem. So, in the United Kingdom at the beginning of the industrial revolution, for example, the water needed to be pumped out of coal mines in order to enable extraction to continue and deeper mining to take place. This was a very precise diagnosis of the problem with regard to what needed to be achieved. Sooner or later, technological solutions were found based on this. This is, if you will, the most direct route. There is also the other extreme. This involves technologies which retrospectively present themselves with reference to what they are able to resolve. So, first there is a solution, but there is not yet a problem for which that solution is useful. This is more characteristic of the sorts of technologies emerging from basic research. Basic research does not necessarily start out by focusing on related applications. If a chemist looking into a basic research problem discovers a new material, then decades may sometimes pass before anyone notices that such a material happens to be ideally suited to, let us say, improving the design of artificial hips. And sometimes major coincidences cause such broader views to be taken in the first place and enable us to see things from the right perspective. There is a third variety that lies somewhere between these two extremes. One example here is the telephone. Originally, even the telephone belonged to the first option in that there were relatively specific problems for which a solution was being sought. The objective was to improve telegraphy, firstly for military purposes, secondly for railways and thirdly to aid the stock exchange. All of these three areas wanted better transmission of messages, and this then came about once the telephone was in place. What no one expected was that the telephone—which is still vital to these areas to this day—took on quite different uses after a relatively brief period. These extended beyond these narrow areas and also extended into the private domain. Absolutely no one had thought of this. So, initially, the telephone was only viewed as something which enhances and improves particular work processes. The concept that it could be used to exchange messages with relatives over long distances lay beyond the horizon of those who used and designed the first telephones. This was as generalisation

of use. In some other cases, shifts in use can even occur. In other words, initial use dies out and is replaced by a totally different application. This is the third possibility. Depending on which of these three possibilities is at play, there are also different groups of persons who drive the whole thing forward. The first case is pretty clear-cut. Those who have the problem look around for a potential technical solution. There may also be technical tinkerers who then arrive at a better answer. In the second case, the basic researcher has no interest at all in technical products, and someone else needs to come up with an idea which may deliver something beneficial. And the third scenario has initial operators and drivers, which are replaced or supplemented by completely different uses after a period of time. This brings us to a further mechanism which has a major part to play with regard to issues of technical dynamics—path dependencies. When a new technology has been invented and becomes established as the solution to a certain problem and indeed provides a much better solution in respect to particular points, it is sometimes very difficult for this new technology to be given a chance. There are many reasons for this. Producers of the old technology are unable or unwilling to relearn. They would, for example, need to completely reshape the skill sets of their employees and undertake other similar tasks. Another reason may be that users have become accustomed to the old technology and don't see why they should make a change. #00:15:49-5#

Which consequences will arise from technological change?

One important type of dynamism that has taken place here and has been an object of multifarious consideration in the area of the sociology of work is the dynamics of the dissolution of boundaries between work on the one hand and non-work on the other. Constant availability for company matters, including during leisure time, is something which was simply not possible and therefore did not exist prior to the development and dissemination of certain technologies such as the mobile phone. For this reason, this method and the subsequent aspiration to contact staff at all times were not available to employers at all. They are now able to do so, and attempts need to be made to combat this normatively, morally or legally. Individual trade unions or works councils have already launched initiatives aimed at negotiating certain rules with employers. This is, however, extremely tough to achieve because the employers have, of course, quickly perceived just how advantageous the whole thing is for them. So dissolution of boundaries is one of the dynamics that has occurred. A second development, I think, is that we have seen the further consolidation or exacerbation of a societal problem which we already faced. Certain poorly qualified people are finding it increasingly difficult to obtain any kind of work at all, except in the provision of very simple services. This means that the ambivalence inherent to this and every other technological development could escalate. So, if we wish to make such great progress in a positive sense, then we must be prepared to accept correspondingly high risks in terms of the negative consequences. This means that the polarisation between supporters and opponents of such technologies and of such types of technical advancement could become even more extreme. Hopefully, this will not take on the kind of fundamentalism which we can nowadays already see beginning to emerge in other regards. One possible explanation for disruptive technological developments could be that, as we have already mentioned,

no use was made for a long period of time of certain areas of potential inherent in basic theoretical research and findings. This has generally been because basic researchers were interested in totally different aspects of their work before external attention was suddenly drawn to this potential by whatever coincidence, and the potential then gets used. After all, “disruptive” means that the obvious or next step towards optimisation is not taken. This is not a policy which involves developing technology in small stages. A kind of leap to a completely different area of deployment takes place. As we have said, one of the defining factors of basic research in differentiation theory terms is that it begins by being indifferent towards technology. It will constantly produce things which it does not notice as being technologically useful, and others looking from outside will come up with the idea. This is one conceivable possibility. A second possibility could involve large scale research models of technological development. The first major example of this was the Manhattan Project, the construction of the atom bomb. Basic theoretical knowledge from the field of physics had been in place for around ten years. This meant that physical conception of the project was no longer a problem, though many engineering and some chemical problems still remained. Time pressure to gain a crucial advantage in the war was very strong. So they said: “Let’s throw a whole bunch of specialists with complementary skills at this technological problem. We’ll relieve them of all other duties and put them under time pressure.” #00:21:36-7#

How are drivers and consequences of technological change connected?

The inequality structures of our society are visible in at least two regards, including in terms of the drivers of technological development. Firstly, very many technologies have produced a so-called trickle-down effect. Fashion, specifically clothing fashion, is a case in point. So, initially, the upper classes are able to afford very expensive technologies in areas such as the household or leisure. This creates an aspiration amongst other societal groups also to obtain, for example, a washing machine. The articulation of this aspiration then acted as an impetus for trade and industry to consider how such technology can be made cost effective enough to serve a mass market instead of just a small group. Many technologies have achieved mass dissemination via this top-down route. The fact that such a mechanism works also provides a powerful impetus for endeavours of this kind to be undertaken. The second direction of travel is, so to speak, the use of technical progress as an instrument to pacify struggles that otherwise would centre on inequality. The German sociologist Niklas Luhmann, who was sometimes capable of a caustic turn of phrase, expressed himself very succinctly on this topic. I cannot find the precise quotation despite a long search, but the essence was as follows: “The class struggles of the nineteenth century ended with the invention of margarine.” This means that a cheaper replacement for the higher end product of butter, which poorer people could not afford, ensured that the standard of living and life opportunities of broad groups of the population were served. #00:24:07-2#

What measures can be taken to steer technological change?

The constellation of actors is enormously multi-layered and is in particular located at

different levels. Firstly, there is the level of individual users in the area of everyday technologies. This constitutes a whole mass of users and perhaps also of non-users, the aim being to turn these people into users, too. Then we have the level of technology producers, i.e. companies and other organisations including research institutions which are behind the whole thing. Thirdly, there is the level of state or interstate regulation. Although this oversimplifies things, it produces a three-level structure which gives rise to the following question: "What opportunities actually exist at the lowest technology design level?" I see virtually no direct and intentionally productive possibilities. Users basically need to start by looking at what they are offered. This means examining which design considerations and effects are actually expressed at the other two levels. This is, if you will, the only way in which users, individual users, are able to take this degree of opportunity to misappropriate technologies, so to speak. To think of how they can use certain technologies in a different way to that foreseen by the designers. The history of technology tells us that this is certainly possible to a considerable extent. Design potential at the lower level, at the user level, is certainly there. But using technologies for a purpose other than the intended purpose is a subversive design moment. At the medium level, where actual technology development takes place, the upper hand is of course held mainly by those who discover the findings to emerge from basic research and then use this for their own ends. Naturally, however, they are dependent on the opportunity structures offered by upstream fundamental research and on whether these are hermetically sealed or open up options and opportunities for technological development that is as yet unknown. And the design actors on the company side are then mostly ultimately involved. We know from organisational research that there are often conflicting relationships between a company's research and development and other departments, particularly departments involved in production or from marketing and sales. At this level, these conflicting relationships frequently once again lend expression to path dependency. Of course, researcher and developers are constantly seeking to do something new whilst the others tend to display reticence. This is because every product improvement and every change to production processes ensures that established routines are shaken up and need to be readjusted. This often needs to take place whilst full operations continue, including within organisations which could be considered technical producers or drivers or at more hesitant participants. Both have design structure opportunities of which they make use. Then finally there is the **state and interstate level, where the main focus is on regulation of technology. There are design structure opportunities here too. Certain technologies or certain uses can be forbidden or restricted. Incentives can be put in place to ensure the dissemination or retention of certain technologies etc. And all of this is exploited, although we can also see at the same time that the capacity of national states to act is shrinking in many other policy areas. This means that when certain technologies are widely disseminated in the rest of the world, it becomes increasingly difficult for the individual national state to use governments and parliaments as a vehicle to ban such technologies or to guide them in a completely different direction.**