Alienability, Rivalry, and Exclusion Cost

Three Institutional Factors for Design

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Twentieth century social science developed penetrating analyses of formal and informal institutions on many levels, yet both philosophers and specialists in design have yet to avail themselves of the implications that these analyses have for understanding the technological transformation of the material world. Three ideas from institutional theory are particularly relevant to technical change. Exclusion cost refers to the effort that must be expended to prevent others from usurping or interfering in one's use or disposal of a given good or resource. Alienability refers to the ability to tangibly extricate a good or resource from one setting, making it available for exchange relations. Rivalry refers to the degree and character of compatibility in various uses for goods. These concepts allow us to pose questions that have been asked by Herbert Marcuse, and Langdon Winner in a more pointed way: if technology is in part responsible for the shape of our institutions, and if institutional change in the sphere of law and custom can be subjected to philosophical critique and democratic guidance, why should not technology be subjected to the same critique and guidance? Specifically, why should not technical designers account for factors such as exclusion cost, alienability, and rivalry in considering alternative designs? Why should not the developers of technology also be socially and politically accountable for consequences accruing from alterations in alienability, rivalry, or exclusion cost?

1 Institutions and Institutional Change

Institutions are standing practices or patterns of human activity that can be described in terms of rule-governed behavior. *Formal* institutions are those that are explicitly articulated as rules, and that are reproduced and enforced by organized social entities, especially the state. Hence, formal institutions are laws and public policies. *Informal* institutions are standing practices that subsist on the basis of

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common knowledge, tradition, and culture. They are reproduced through legend, lore, apprenticeship, imitation, and perhaps all manner of common experience. Their enforcement mechanisms can include approbation, praise, shunning, or group inclusion but consist mainly in the way that they constitute the framework for successfully negotiating the most basic tasks in social life (Commons, 1931). Although vague, this simple set of definitions provides a basis for interpreting the last millennium of European history as the gradual displacement of informal institutions by formal regimes of law and policy.

Philosophers of the Enlightenment and early Modern Age were deeply complicit in this displacement, typically viewing formal institutions as superior in virtue of their capacity for explicit articulation, widespread application, and critical evaluation. A rule that cannot be clearly stated cannot be criticized or justified, much less enacted by a civil authority, even if it can be reliably followed by those who are appropriately socialized. Perhaps philosophers' predilection for argument, demonstration, and verbal disputation disposed them to regard formal institutions as inherently rational, or perhaps we should say, as C. B. MacPherson (1962) did, that those interests most consonant with the evolution of property rights and state authority naturally aligned themselves with philosophers who were advocating explicit, rational evaluation of society's rules. For present purposes, the key point to notice is the underlying and largely implicit connection between formal, state-based institutions and modern conceptualizations of rationality and right.

The philosophical bias in favor of formal institutions declined in the Romantic period, as philosophy begins to pine for a lost sense of belonging and community solidarity. In 1897 the German sociologist Ferdinand Tonnies theorized modernization as a transition from *Gemeinschaft* to *Gesellschaft*, and in 1914 Max Weber characterized it as a process of rationalization toward increasingly bureaucratic decision-making. Weber and Tonnies (along with Marx, of course,) provide the backdrop for the first wave in 20th century German philosophy of technology, a movement of thought that includes such diverse figures as Martin Heidegger, Theodor Adorno, and Herbert Marcuse. Although their political orientations were often antithetical, all of these thinkers challenged the bias in favor of rationality, associating it deeply with technology and industrialization, which they often seemed to equate with a particular conception of scientific method. One oft noted weakness in this approach is that it gave precious little attention to the mechanisms that link technology to the industrialization process. In focusing so intently on scientific rationality, and on the complicity with capital noted by MacPherson, these thinkers ironically made it seem as if all the important work to be done was philosophical. There was nothing much to say to actual designers.

In contrast to these philosophers, British labor historian E. P. Thompson argued that many of the transformations that contributed to the industrialization process occurred at the material level. These included the alienation of ordinary food from the circumstances in which the production, distribution, and consumption of grain had been embedded so that it could be traded as a commodity good. Before the 18th century, the grain growing in an English field would have been considered the

common property of the parish. An elaborate system of informal concessions governed the share to which each parishioner was entitled, as well as the tasks such as harvesting, milling, or baking that each was obligated to perform. However, as roads and wagons improved the farmers who harvested and bagged grain saw opportunities to sell it in other villages or wherever prices were best, ignoring the informal assessments and shares that governed the distribution of grain under traditional practice. How are we to interpret this situation? Do the farmers have a right to seek the best price for their grain, or is the common property of the village?

Natural law philosophy tended to notice a few key things about grain. First, the farmers who come into first possession of a parcel of grain through the labor of sowing and harvesting can easily keep tabs on its location and use, and it is fairly easy for the grain to change hands by sale or gift. Furthermore, once consumed for one use, the grain is gone. It cannot be re-eaten by another. These natural characteristics of grain were seized upon by natural law theorists, who saw a sack of grain as something naturally fit for property rights, formal institutions sanctioned by the power of the state. Thus, the natural law theorists endorsed the farmers' right to claim ownership of the grain, and redefined the sack of grain as a commodity good, replacing the informal social institutions of entitlements and shares with the formal institution of state sanctioned commodity exchange (Thompson, 1971).

Thompson's analysis notices both stabile and technologically transformed features of the material world: the fact that grain is consumed in use remains stabile, but grain only becomes alienable and available for exchange through becoming transportable, that is, through a technical change. In creating their rationale for private property, the natural rights philosophers fixed upon a particular configuration of these material properties and invested it with the notion of right, backed by the power of the state. The "natural" state of things might have looked rather different before the advent of roads and wagons, however, and a different configuration of institutions might have been selected as the one that was, to any rational person, right.

There are many lessons that present day philosophy of technology might take from Thompson's history of social institutions, but the point most relevant to a philosophy of design is that the technological transformations that precipitated these decades of upheaval involved the creation of alienable goods, goods whose production and distribution can be controlled. Prior to the work of those who designed and executed the roads and wagons of the English countryside, the "natural" configuration of grain supported an effectively common property status enforced by informal norms. After that work, the "natural" configuration of grain supported private property claims on the part of farmers, claims that required the formal endorsement and enforcement of the state. Although the men who designed the wagons and roads of late medieval Europe were certainly not thinking about how they would affect the material properties of barley, wheat, and rye, their work did alter the *alienability*, the *exclusion cost*, and the *rivalry* of these goods. Understanding the link between technical design and institutional change thus demands that we understand alienability, rivalry, and exclusion cost more clearly.

2 Alienability

Alienability is the degree to which a good or potential item of use can be extricated from one setting or circumstance so that it can be transported to or utilized in another. A critical aspect of alienability is the ease with which something in the possession or employ of one human being can be transferred to the possession or employ of a different human being. The right to life is characterized as an inalienable right because a life can only be lived by the individual whose life it is; it cannot be given or sold to someone else. Hence the *right* to live can only be exercised by the person whose life is at stake, it cannot be alienated from that person and exercised by someone else. Alienability determines whether a good or right can meaningfully be subject to exchange. It is thus a necessary prerequisite for any item of property, at least as this notion has been understood in the natural law tradition.

It is important to note, however, that a fairly large component of sociability depends on the degree to which various items or goods are alienable or alienated from one another. For Thompson's peasants, the fact that it was rather difficult to separate large quantities of grain from inland locales where it was grown prior to the advent of better roads and wagons made for a situation conducive to the embedded relations of production and exchange that were characteristic of feudal society. The inalienability of grain from place was, of course, a situational rather than a metaphysical necessity. Other situational forms of inalienability include the impossibility of separating a musical or theatrical performance from the person of the artist prior to the invention of photography and audio recording. Prior to 18th century legal reforms documented by Karl Polanyi (1944) it was also legally impossible to separate the labor power of a worker from the parish in which he was born.

These situational types of inalienability can be changed, in the latter case by changing the law and in the former cases through material transformation. We may speculate that in virtually every case it is difficult to imagine how goods might be alienated one from another until it has become obvious that it can be done. In our own time, traits that might have been thought to be inalienable characteristics of certain plants or animals can now be readily encoded in genetic sequences and transferred to totally different plants and animals through genetic engineering. These traits, or at least the genes that confer them, have even been alienated from organisms altogether and put on the market all by themselves in the form of licenses that plant or animal breeders may purchase so that they may then transfer the trait to different organisms. It would have been difficult to conceptualize the growth rate of a fish as something that could have been alienated from the species or type of fish prior to this development in genetics. If you wanted fast growing fish, you would have to get fish that grew quickly. But growth rate has now been alienated and it is now possible to build a fast growing fish, or a fast growing anything, simply by buying the gene construct (Muir, 2004).

3 Rivalry

Rival use or *rivalry* is the degree to which alternative goods or uses of goods come into competition. One way in which two alternative uses of a good can compete is when they are consumed in use. Eating the grain is a comparatively rival use because it can only be eaten once, and this use exhausts the possibility of its being used by another person or in another way. Enjoying the scenic beauty of the waving fields of grain is a non-rival use because not only can more than one person obtain this good from a single field of grain, scenic beauty can be enjoyed repeatedly. It is also possible to use the concept of rivalry to describe the relationship between two or more goods that can be substituted for one another and which therefore come into competition in market relations. Thus beans and corn may be rival in that both can be eaten, and a shopper may opt for beans when the corn is too expensive. But beans and corn are non-rival in that you cannot use beans to make Tennessee whiskey, so a moonshiner is never in the market for beans. Rivalry is thus situational, and situations can change. Since antiquity, farmers have made use of seeds, planting them to grow a crop. The crop produces more seed, which can be planted again. In this sense, using a seed to plant a crop is a qualified non-rival use. It does not deplete the amount of the good available for future uses, though it does make the good temporarily unavailable while the crop is in the ground. Genetic use-restriction technologies (GURTs), or so-called "Terminator" genes, can be used to create seeds that when sown as a crop will not produce more seeds. GURTs thus transform the use of seeds to sow a crop from a non-rival to a rival use (Conway, 2000).

Alienability and rivalry are critical to the creation of exchange relations because they influence the degree to which a good is amenable to the process of, and the need for, exchange. Goods that cannot be alienated effectively become a single good for the purposes of exchange, if they can be exchanged at all. Rival goods are depleted by use, and hence must be obtained and replenished prior to any use, or they may substitute for one another, also affecting the need to obtain them through exchange. Thus, whether exchange takes the form of sale, gift, or grant, it is primarily alienable and rival goods that are the object of exchange. Or to put this in somewhat different terms, although human beings can exchange glances, insults, and affection, it is the exchange of alienable and rival goods such as a sack of grain, a team of oxen or a day's work in the fields that constitute the paradigmatic form of the economic social relationship.

4 Exclusion Cost

The degree to which alienable and rival goods precipitate social relations characterized by commercial exchange also depends on the ease with which the various uses of a good can be limited or controlled through access or possession. *Exclusion cost* is the outlay in time, trouble, and expenditure of resources that is required to

prevent others from having access to a particular good or item of property. Like alienability, exclusion costs are in large measure a function of the material characteristics of the goods human beings utilize and on which they rely. Oxygen and vitamin D are alienable and rival goods, but it is fairly difficult to prevent people from having access to air and sunshine. It is, in contrast, fairly easy to keep jewels and trinkets where no one else can get them, hence the latter have more typically been understood as saleable items than the former. Items with very high exclusion cost are unlikely to be traded commercially.

Like alienability and rivalry, exclusion cost is amenable to situational variation. Situational change in exclusion cost has often taken the form of material manipulation of either the goods in question or of the circumstances in which they reside. Locks and fences are the classic technologies of exclusion, and a better lock will lower the cost of excluding others every time. It has also been possible to reduce exclusion costs through the development of informal institutions. Simply declaring that certain parties have an exclusive right to use a good will suffice in many cases. Queuing for service is among the most venerable of informal institutions in Western cultures, and everyone recognizes that the person at the front of the line has an exclusive right to be served next. If being served next is the good in question, we may thus say that for the first in the queue, the cost of excluding anyone else from this good is very low. By common consent, customary recognition of this right saves everyone a lot of time and trouble, making the cost of many daily transactions far more reasonable.

When customary rights of exclusion are threatened, it is always possible to bring in the coercive power of the state to back them up. The police represent a formidable way of lowering exclusion cost for all manner of private property. A person who would have to guard or defend an item of property can call on the police to do it, and the knowledge that arrest and prison are among the possible consequences of an unlawful taking raises the cost of theft, simultaneously lowering the cost of exclusion. Copyright and patent laws represent formal institutions that place the coercive power of the state behind a broad array of exclusive practices, even when no tangible property exists. The legal remedies of intellectual property law vastly reduce the cost of preventing others from using one's intellectual creations through intimidation, bullying, spying, and other forms of self help.

Alienability, rivalry, and exclusion cost represent features of the various items and entities in the world, including personal services and material things, that collectively determine which items and entities come to be the object of exchange relations, and which ones remain embedded within a more inchoate and presumptive context of social practice. It is very likely that anything alienable, rival, and excludable will be regarded as an item of personal or private property. It should not be surprising that when goods lack one or another of these three dimensions, people try make up for it either by passing laws or by changing the world in a material way. As institutional economists developed their analysis of these traits, they brought the economists' bias that enabling transaction is always a good thing. They also brought the social scientist's bias of focusing on social practice, and especially on formal institutions. As such, they have tended to focus on legal or policy reforms that will

lower the costs of making an exchange. But as my illustrations demonstrate, it is as equally possible to affect alienability, rivalry, and exclusion cost with a technical as with a legal change, and that change may or may not be a focus of design.

5 Changing Things by Design

The material dimensions of alienability, rivalry, and exclusion cost represent a "given" or natural infrastructure in which informal institutions evolve, either by chance or by design, and a set of background conditions against which formal institutions are formulated and enforced. When those background conditions change, by chance or by design, the entire significance of social institutions can be altered. All of which raises the question: if changes in the formal institutions of society are appropriate targets for political philosophies and theories of justice, why not also the technological transformation of alienability, rivalry, and exclusion cost? This is, I take it, a somewhat more focused restatement of a question that has been asked many times before. Herbert Marcuse's *One Dimensional Man* suggests that the failure to subject technical systems to normative scrutiny is both a political and a philosophical failure. The political failure resides in the increasing power of capital and commercial interests to dominate all forms of discourse in industrial society, while the philosophical failure consists in positivist doctrines that created an epistemological space in which questions about technical efficiency were regarded as "value free," (Marcuse, 1966)

For most people involved in the practice of design, Marcuse's characterization of technology has seemed to be too metaphysical, too Heideggarian, and simply too vague to be of much use. Langdon Winner has had more success in calling for critical evaluation of technology and technical change by describing what he calls "the technological constitution of society." This is a material and organizational infrastructure that predisposes a society toward particular forms of life and patterns of political response. Winner illustrates his idea with a number of examples, notably technological systems such as irrigation systems or electric power grids that dispose societies toward centrally administered, hierarchical relationships of political power (Winner, 1986). We should notice that what accounts for such tendencies is the way that these systems affect the alienability, rivalry, and exclusion cost of the respective goods, water, and energy, that they produce and distribute.

Centrally administered irrigation systems in the ancient world and contemporary electric power grids succeed in part because they represent technical solutions to real problems, but they also have the effect of converting goods that are comparatively non-rival with high exclusion costs, into goods that are just the opposite. Water and energy are virtually everywhere in most locales, though frequently not in large enough concentrations to accomplish certain critical tasks such as agriculture or manufacturing. In their natural state, water and energy have high exclusion costs; it takes a bit of trouble to keep people from having access to them. Natural water systems such as rivers and springs also serve a number of purposes

simultaneously and in this sense are comparatively non-rival goods. Though generally depleted in use and in that sense naturally rival, energy in the form of wood and mineral fuels or localized wind and water mills is relatively specialized in the types of work it can be expected to perform. One type yields heat and the other mechanical power, and further technology is needed to reconfigure them for other purposes. Thus water and energy are relatively non-rival under these configurations of the material world. The irrigation system and the power grid reduce exclusion cost as they increase rivalry, and the result is goods that are far more amenable to centralized control and to commodity exchange than water and energy are without these technological infrastructures. What is more, both systems provide a way to alienate their respective goods from a local setting, much as wagons and roads transform the alienability of grain. Thus, alienability, rivalry, and exclusion cost are part and parcel of what Winner has called the technological constitution of society. These traits specify the politically important design parameters of a technological system more clearly.

However, if the conceptual framework made available by institutional analysis allows us to sharpen the questions we wish to direct at technology, it also results in a deflation of the thesis that technology needs to be questioned. First it is clearly specific tools and techniques as utilized in specific situations that give rise to the material consequences I have been illustrating, not "technology" as a metaphysical force. Second, not all of these material changes will rise to the level of political importance. One would hardly object to better locks on the ground that they lower the exclusion costs for people who use them. That is what locks are supposed to do. Third, Marcuse's belief that there is a dominant logic or trajectory of technology is weakened, rather than strengthened, by the institutional analysis. Technological change has the potential to affect alienability, rivalry, and exclusion cost in myriad ways. Xerox copiers, computers, and the Internet have raised the exclusion cost for goods such as texts, audio recordings, and images, at the same time they have made them less rival. As a result, these items are less easy to control and less like commodity goods. Not surprisingly, those who benefited from the old material structure have moved quickly to encourage the enactment of formal legislation that would restore some the rivalry and lower the costs they incur in excluding what they take to be unauthorized use.

Finally, even if technology should be questioned when alienability, rivalry, and exclusion cost are affected, it is not at all obvious what the answer should be. Analysts who use the word "commodification" generally think that this kind of change is a bad thing, but economists who talk about reducing transaction costs generally think just the opposite. In both cases, there may be an understandable but false assumption that the material infrastructure of the world is relatively fixed, so that the processes in question always involve manipulations of law and policy. This assumption may then map transformations in alienability, rivalry, and exclusion cost onto rather well-worn political ideologies. Hence, "commodification" is bad because it favors capitalist or bourgeois interests, while lowering transaction costs is always good because it allows rational agents to more successfully maximize the satisfaction of subjective preferences. Even if this is generally correct for changes in formal institutions, which I doubt, it will simply not do as a sweeping analysis of technical change.

6 Some Concluding Comments for Designers

The foregoing discussion is intended to explain how alienability, rivalry, and exclusion cost become incorporated into technologies, and why these features are particularly important from an ethical or political perspective. But perhaps it is still not obvious how they are relevant to design. In one sense, designers (by which I, with the other authors in this volume, mean those who make decisions about key features, standards and configurations of a tool or technique) have long been attentive to these features. When engineers develop a feature for a product that will be technically difficult or costly for competitors to duplicate, they are affecting the rivalry and exclusion cost of the product. When they develop "work-arounds" to avoid licensing costs, they are responding to aspects of alienability, rivalry, and exclusion cost that have been formally institutionalized through patent law. When equipment manufacturers utilize a strategy of "planned obsolescence," they are ensuring rivalry between the product they make today and a product they will make in the future.

There has, however, been little previous attention to these institutional features in the philosophy of technology. This chapter thus brings some fairly standard aspects of design into view for philosophers. Yet some of the examples discussed above had institutional impacts that no one foresaw or intended. It is doubtful that those who developed roads and wagons intended to affect farmers' ability to alienate the grain growing in their fields from the local village economy. It is also worth noting that any attempt to make a normative evaluation of how a given design affects institutions will depend a great deal on very specific aspects of the technology in question, as well as the socio-economic environment in which it will be deployed. Thus there does seem to be some room for designers and philosophers alike to give renewed attention to institutional impact in developing a new product or a new configuration of technical means. Any *ex ante* use of the considerations described in this chapter to plan and evaluate technical design will need to be fleshed out with an economic analysis (see North, 1990), as well as a great deal of specific detail that only designers themselves can provide.

Lawrence Lessig's detailed studies of the way that technical codes affect alienability, rivalry, and exclusion cost for software and the Internet provide one of the best examples of how recent design questions involve institutions. Lessig contrasts the design of internet architecture at Harvard and the University of Chicago, showing how the Chicago system has inherently high exclusion cost incorporated into its code. The result is that the Harvard design permits system administrators to make case by case decisions about when barriers will be lowered for a given user (Lessig, 1999). Lessig also argues that net protocols might have been designed so that movement of bits over the network was application specific. That is, the protocol for transferring text files might have been different from that of moving bits that code for MP3 or video. This would have introduced a form of rivalry into the system that would have facilitated centralized control, as opposed to the information commons that currently exists (Lessig, 2002). Lessig's work shows that when we question the institutional implications of technology, we will need to look closely at the actual implications of a specific technical change before we will

be in a position to speak about whether it is good or bad. It is to his work that designers wishing to operationalize the ideas in this chapter should turn.

In conclusion, achieving a clear understanding of alienability, rivalry, and exclusion cost can help both designers and philosophers of technology do some of things that they have long aspired to do better. In the case of designers, alienability, rivalry, and exclusion cost represent parameters that go a long way toward predicting some of the most socially sensitive and historically contentious elements of a technical change. Be advised that such modifications will require careful planning and a well-crafted participatory process of design and implementation. For philosophers, alienability, rivalry, and exclusion cost help us to look for at least some of the details that really matter when technical change occurs. A focus on alienability, rivalry, and exclusion cost thus provides a promising way to integrate the philosophy, sociology, and economics of technology, and to clarify some of the more obscure mechanisms that have been associated with technological determinism and social history. Alienability, rivalry, and exclusion cost also represent elements of specific technologies such as genetic engineering or information technology that serve as boundary objects linking alternative networks of actors, and bridging normative with classically technical domains. As such, alienability, rivalry, and exclusion cost provide a focal point for the ethics of technology, and should be considered in any attempt to identify the elements of a novel technology that are most in need of deliberation and public discussion.

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