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).