action Z, or to refrain from some action or behavior W." If the authors of trusted digital repositories articles would adopt this pattern and consider the consequences of each Z and each W, they would materially advance their professed agendas.

As an objective, 'trusted' is misleading. Instead, one should focus on encapsulating information so that it is *trustworthy*.

What's 'the Original'? What's 'Authentic'?

In casual conversation, we often say that the copy of a recording is authentic if it closely resembles the original. But consider, for example, an orchestral performance, with sound reflected from walls entering imperfect microphones, signal changes in electronic recording circuits, and so on, until we finally hear a television rendering. Which of many different signal versions is the original?

Difficulties with 'original' and 'authentic' are conceptual. Nobody creates an artifact in an indivisible act. What people consider to be an original or a valuable derivative version is someone's subjective choice, or an objective choice guided by subjective social rules. We can, however, describe any version objectively with provenance metadata that expresses everything important about its creation history.

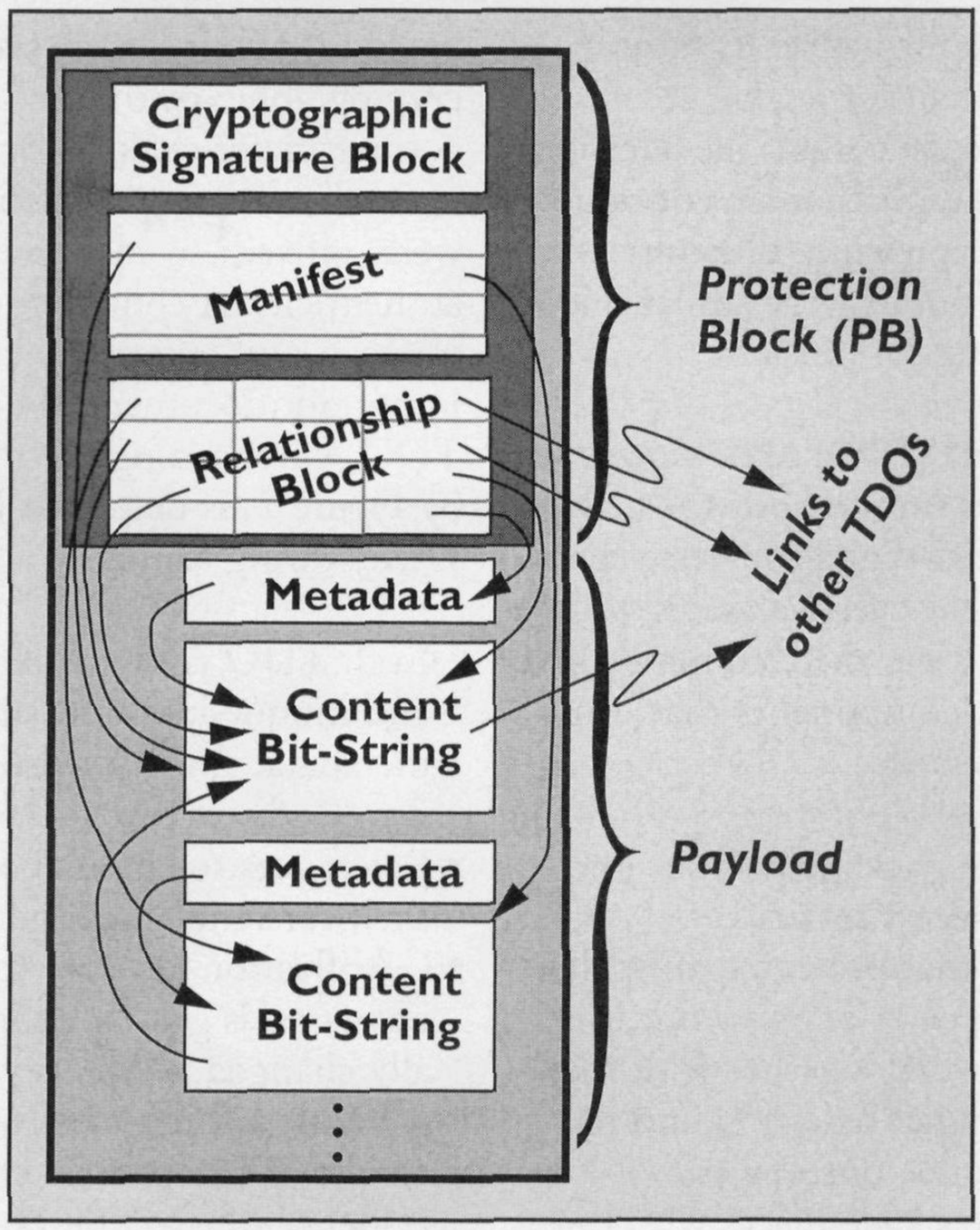

Figure 2. A trustworthy digital object (TDO).

Conventional definitions, such as "authentic: of undisputed origin; genuine," do not help operationally. For signals, for material artifacts, and even for natural entities, the definition shown in the sidebar here captures what people mean when they say 'authentic'.

Each $\mathbf{T_k}$ represents a transformation that is part of a Figure 1 transmission step. To preserve authenticity, the metadata accompanying the input in each transmission step should be extended by including a $\mathbf{T_k}$ description. This metadata might identify the author of each $\mathbf{T_k}$ choice and other circumstances important to consumers' judgments of authenticity. Each eventual consumer will decide for himself whether the available evidence is sufficient for his particular purposes.

Preserving Dynamic Behavior. A prominent collaborative archivists' project suggests conceptual difficulty with preserving "dynamic objects" (representations of artistic and other performances) digitally [1]. We see no new or difficult technical problem; what differs for different object types is merely the ease of changing them.

A repeat R(t) of an earlier performance P(t) would be called authentic if it were a faithful copy except for a constant time shift from some t_{start}, that is, if $R(t)=P(t-t_{start})$. This seems simple enough and capable

Defining 'Authentic'

Given a derivation statement R, "V is a copy of Y (V=C(Y)),"
a provenance statement S, "X said or created Y as part of event Z," and
a copy function, "$C(y) = T_n (\ldots (T_2(T_1(y))))$,"
we say that V is a *derivative* of Y if V is related to Y according to R.
We say that "by X as part of event Z" is a *true provenance* of V if R and S are true.
We say that V is *sufficiently faithful* to Y if C conforms to social conventions for the genre and for the circumstances at hand.
We say that V is an *authentic copy* of Y if it is a *sufficiently faithful derivative with true provenance*.