Securing organizationwide support is typically the greatest challenge in any successful metadata implementation.

Object Management Group, led by Oracle, promoted CWM. Both standards allow data warehousing tools to keep a proprietary form of metadata while permitting access to it through a standard interface. However, they differ in their mix of exchangeable metadata elements and in their exchange formats and hence are not readily interchangeable.

The existence of competing standards complicates the selection of tools for a data warehouse implementation. To facilitate easier integration, it is preferable to select a mix of tools committed to the same metadata interchange standard. Alternatively, the standard gap can be bridged through specialized metadata management tools (such as MetaCenter by Data Advantage Group, Advantage Data Transformer by Computer Associates, MetaBase by MetaMatrix, and Unicorn System by Unicorn). These tools provide a unified metadata infrastructure, broad coverage for technical and business metadata, the claim of being vendor-independent, and support for multiple metadata exchange formats. XML, another emerging solution for integration is the standard for data interchange among distributed applications. XML is used by CWM for metadata exchange, integrating both data and metadata into a single structure.

Design paradigms. Organizations face several choices when designing an enterprise repository. An elementary choice is from among the top-down, bottom-up, and hybrid strategies needed to capture requirements. A top-down approach would look at the entire set of organizational information systems and try to capture an overall metadata picture.[3] A bottom-up approach, on the other hand, would start from the lower granularity of subsystems and bring their metadata specifications together into one unified set. While a top-down paradigm is more likely to ensure standardization and integration among subsystems, it might be infeasible in cases involving information systems with local metadata repositories already in place. Moreover, capturing metadata requirements for an entire organization is a complex and tedious task that might not be completed in a reasonable time. The bottom-up paradigm, focusing on specific system, is more likely to achieve short-term results but fail to satisfy broader integration needs.

Organizations may compromise by choosing a hybrid approach that still starts at a high level but focuses on the metadata modules more critical to the organization, as well as key functionality types (such as semantic layer, security configuration, information flow rules, and data quality assessment). The key modules serve as the base for a core repository that becomes a centralized metadata source for those specific functionality types. The metadata repository is not comprehensive or exhaustive to start with. Subsequent to the core implementation, initial modules may be expanded and others added incrementally as the repository grows. Compared to the top-down approach, the hybrid counterpart has the advantage of allowing faster, less-complex, less-costly implementations. On the other hand, it still provides a centralized, integrated solution to the key metadata elements.

The metadata repository architecture is another important design choice [8]. A centralized architecture, corresponding to a top-down paradigm, locates the organizational metadata repository on a centralized server and becomes the only metadata source for all front-end and back-end utilities. Alternatively, a distributed architecture, corresponding to a bottom-up design paradigm, allows systems to maintain their own customized metadata. Hybrid architecture allows metadata to reside with applications but keeps control (and the key components) in a centralized repository.

The chosen design paradigm and derived architectural approach are likely to be influenced by the organizational structure and the complexity of its information systems. It is unlikely that a large organization with sophisticated information needs would adopt a top-down design for metadata and implement it in a centralized manner. Such organizations are likely to have many information systems, hence are more likely to apply a decentralized or hybrid architecture through the corresponding design paradigms. Smaller organizations, with less complex information needs, can afford the luxury of a top-down approach,

[3]Such an approach is supported by several commercial metadata management tools, including the Unicorn System from Unicorn and MetaCenter from Data Advantage Group.