Categorical Information Theory

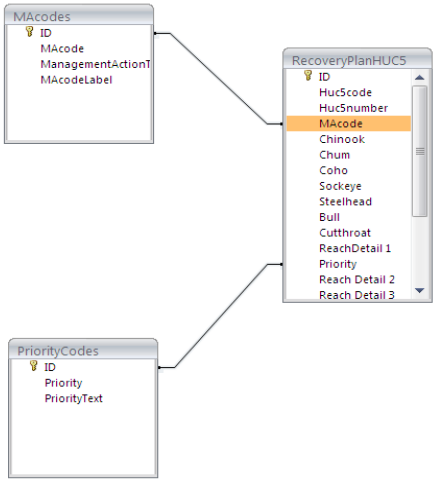

Figure 1. Database schema relating different tables.

STATUS QUO

There is currently no coherent and qualitative theory of information and communication.

NEW INSIGHTS

Category theory is designed to organize complex structures and control the moving parts.

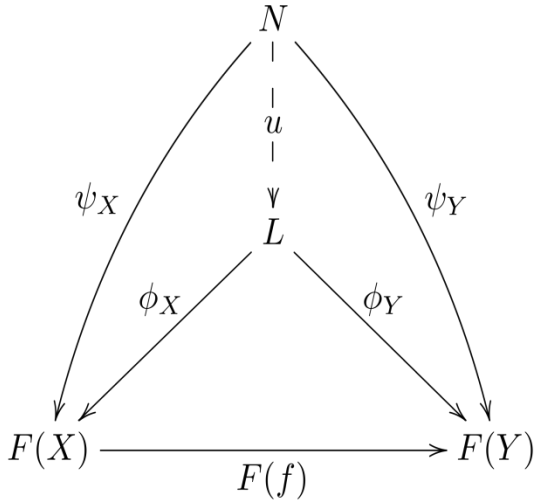

Figure 2. Diagram comparing objects in different categories.

Complex systems have a pressing need to process information efficiently, and the Navy is no exception. A group only functions as a unit when all the parts are in good communication. Data from one part of the structure needs to be transferable to and understandable by other parts. Short-term solutions, such as creating links between data sets in an ad hoc manner, will inevitably fail as the system evolves and becomes more complex.

Needed is a more encompassing and foundational viewpoint about how information should be modeled. Category theory not only provides this foundation, it is a powerful tool for organizing information in a way that is flexible, transferable, and scalable.

QUALITATIVE IMPACT

Working within the category-theoretic model of information will make the Navy more efficient and accurate when processing and communicating information, both internally and externally.

END OF PHASE GOAL

To present a categorical relationship between databases and ontologies, and to formulate a protocol for communication between disparate entities in terms of their respective ontologies.

Category theory provides a base for reliable information and efficient communication.