

## Hyperbolic Browser for Knowledge Management of an ERP Undergraduate Accounting Curriculum

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**Abstract:** This study introduces the application of a hyperbolic browser to ERP curriculum in the undergraduate financial accounting core courses. This application works on assumption of an ERP company organization/data integrated throughout the program. A key benefit for students is that they have a tool which provides a system view and the development of information acquisition skills. This approach facilitates knowledge management in the curriculum and the potential for graduates in the real world workplace.

### I. INTRODUCTION

This is a developmental work of incorporating hyperbolic browsers in a knowledge management accounting curriculum framework. The study will work through the development theoretically and by way of example. Over time accounting information/curriculum has become more complex. With increasing complexity there is a greater difficulty of administration with respect to coverage and control. A means to the administrative end is knowledge management (Swanson and Hepner forthcoming). Big picture overview, mapping and appropriate documentation are several positive features of knowledge management that facilitate accounting curriculum systems as well as an ERP company application to a multi-class curriculum.

What do ERP, knowledge management, and hyperbolic concepts have in common and what could the combination bring in synergistic benefits? That is the focus of this effort. ERP is utilized in all top firms and most middle level firms. Therefore is appropriate to teach ERP to students and utilize within the various applicable aspects of the curriculum. Due to complexity of ERP, knowledge management then becomes a useful means to administrate ERP and its application to various educational competencies (i.e., as evidenced by learning objectives). An issue becomes: How does one move from the specific (detail) transactions to the general (overall) report? Hyperbolic browsers bring to the table the capability of making a graphic presentation of the ERP conduct of business (e.g., Microsoft Dynamics GP) and then following through the numbers to the financial statements.

The remaining sections of the development cover: II. a knowledge management ERP overview, III. hyperbolic browser theoretical characteristics, IV. Hyperbolic browser application development, and V. conclusions with future directions.

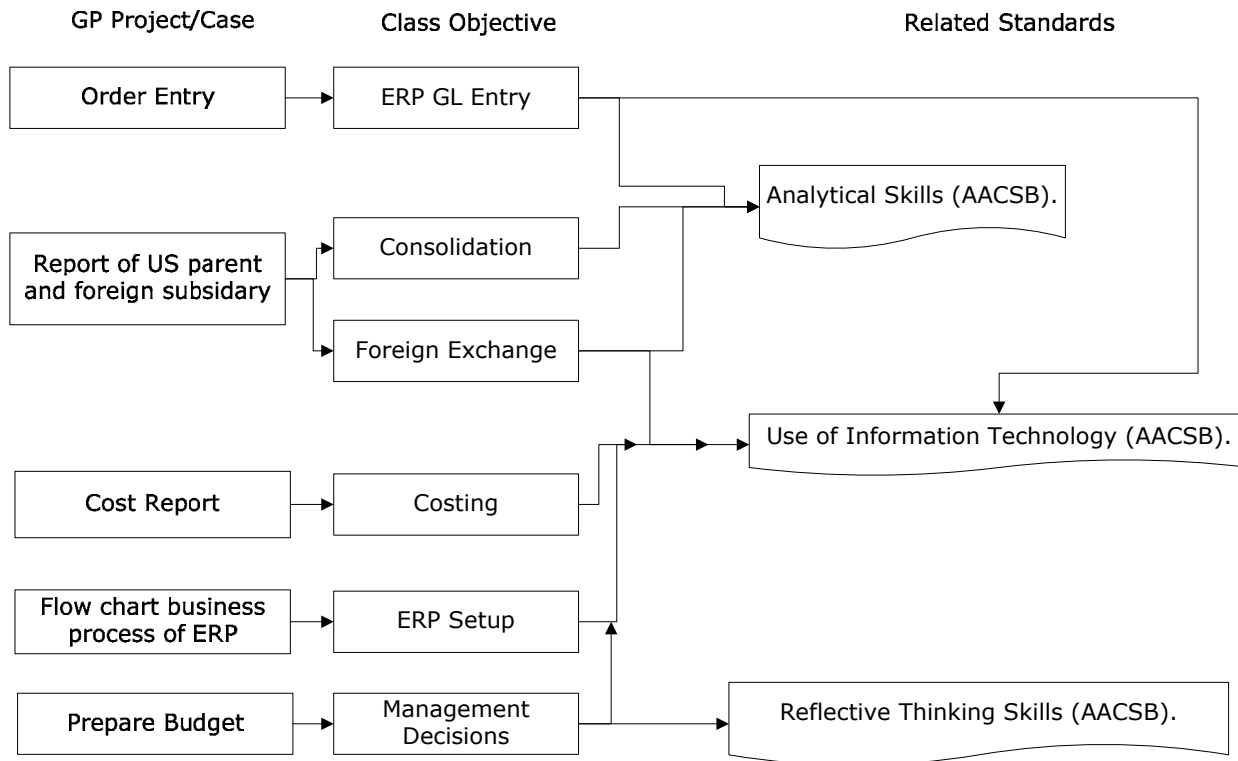
### II. KNOWLEDGE MANAGEMENT ERP OVERVIEW

This section provides a theoretical basis in the literature for the application of knowledge management to accounting curriculum and ERP coursework. Knowledge management has to be based upon an information

structure. In this situation ontology<sup>1</sup> provides the framework. Prior research (Swanson and Freeze 2009) describes the financial reporting Generally Accepted Accounting Principles (GAAP) in terms of ontology. They show how the financial statement structured outputs which are the result of firm transactions base on a value chain then fit an ontological theory specification. Accounting is the processing and reporting of entity economic information that will facilitate decision making and is to be conducted under Generally Accepted Accounting Principles (GAAP). As of this writing, the ultimate authority on this point is the GAAP codification project. The manner of the GAAP codification is highly organized which fits a knowledge management project mode.

Other analysis (Swanson and Hepner forthcoming) demonstrate within accounting curriculum as well as course work, that general ledger and financial accounting can be structured in terms of ontologies. They show a flow chart design (see their Figure 3) for an accounting curriculum example. This example is a demonstration of the nature of multiple learning objective aspects which can be addressed with a knowledge management design to administrate a curriculum.

**Figure 3.**



The next step is to look at the incorporation of ontologies into hyperbolic browsers.

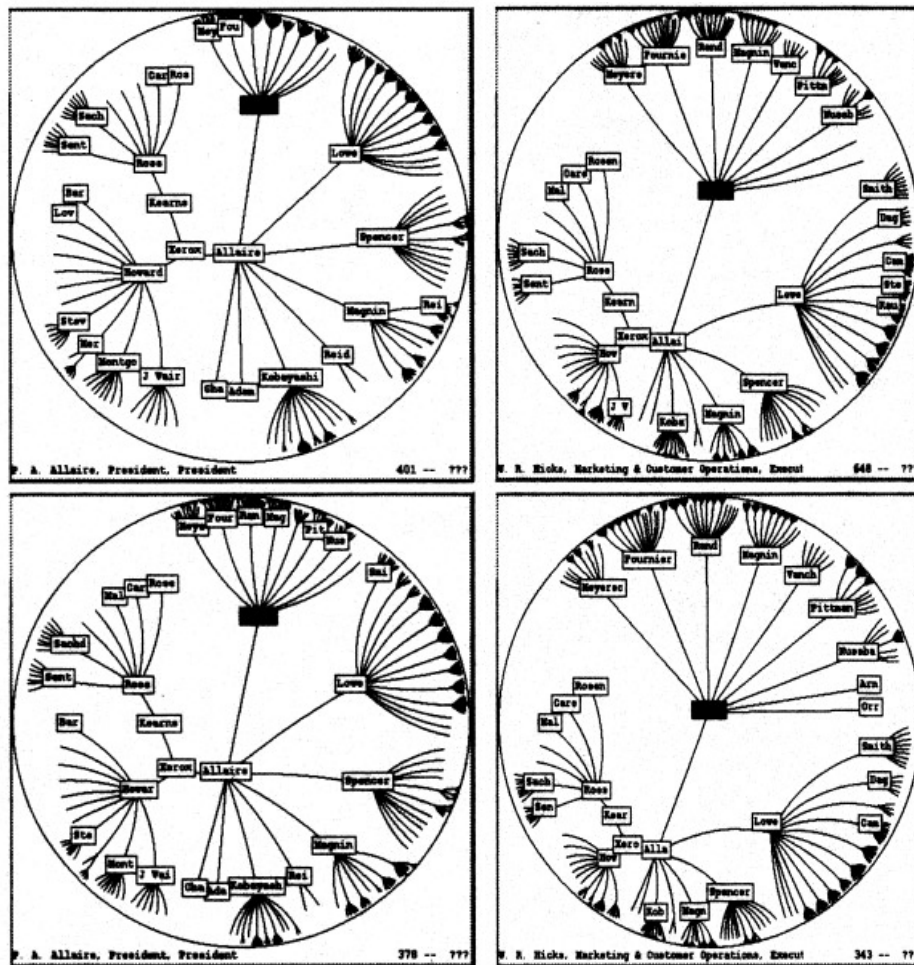
<sup>1</sup> Ontology is a branch of philosophical science whose objective is the study of structures and their characteristics in every area of reality.

### III.HYPERBOLIC BROWSER THEORETICAL CHARACTERISTICS

The research question is the central feature of any academic project. Here the aforementioned question can be formulated as: What will hyperbolic browsers provide for the knowledge management of accounting curriculum of ERP? It's the specification of accounting as an ontology which can be specified as a hierarchical tree structure that provides a theoretical connection with hyperbolic browsers. A paper (Eklund, Roberts and Green 2002) presents a hyperbolic browser tool that represents ontologies in general.

Hyperbolic browsers are best defined by their purpose and application to facilitate the database navigation of hyperbolic space of data trees (Swanson 2010). There is the axiom that the larger the database is ... the greater the advantage of a hyperbolic browser which is a major advantage in ERP. In hierarchical databases of accounting information, as the number of nodes of tree structures become large, the visualization of the information becomes exceedingly difficult to comprehend for students and curriculum management. The hyperbolic tree permits the viewer to focus upon the immediate links and nodes while the other information is deliberately placed out of focus at the extremities (Lamping, Rao and Pirolli 1995). Figure 1 demonstrates a hyperbolic tree example based upon the Poincare disk model (Wikipedia 2010). The miniscule attributes of the reduced view toward the edge change perspective if a particular node near an edge was brought to the center, because it becomes a larger size making it understandable to the user.

Figure 1  
Hyperbolic Browser Diagram Transitions (Lamping, Rao and Pirolli 1995)



The advantage of a hyperbolic browser in curriculum knowledge management and ERP course work centers about two key features that accomplish the mapping of a hierarchical tree structure into a hyperbolic presentation. Allen (Allen 2002) focuses on two hyperbolic browser features from Lamp et al (Lamping, Ramana and Pirolli, Visualizing Large Trees Using the Hyperbolic Browser 1996):

- “1.The nodes or components of the tree diminish in size the farther away they are from the center of the display.
- 2.The number of nodes or components grows exponentially from parent to child.”

The above two features are precisely the nature of ERP curriculum. So, let’s make the connections between ERP generally speaking with curriculum learning objectives and general ledger line items specifically in terms definitions applicable to a hyperbolic browser. With that general theoretical link in mind, the specific next step is an appropriately constructed ontology of accounting that can be theoretically represented with a hyperbolic browser. The next section develops such a design example for ERP systems at the value chain level and shows how a hyperbolic browser can transform the information into a financial statement output. At the same time, the same setup can be used in a knowledge management system of accounting ERP curriculum.

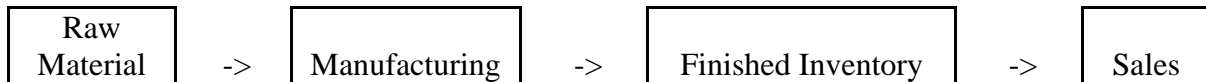
## IV. HYPERBOLIC BROWSER APPLICATION DEVELOPMENT

The defining feature of this work is the drawing together of the accounting at the general ledger and overall financial reporting levels plus the curriculum knowledge management into a hyperbolic browser. A theoretical basis for the synergistic combination of ERP, accounting curriculum and a hyperbolic browser was identified in the previous section. Here, a physical example application is developed. The example works from the detailed transaction level (developed in subsection A) rolling up into financial statements (presented in subsection B). Taking this simple example, the knowledge management of the curriculum would facilitate the course management and accreditation validation. Sample diagrams of a hyperbolic browser will track the information flow. The hyperbolic browser example can be expanded to include additional nodes of learning objectives and accounting competencies.

### A. ERP VALUE CHAIN

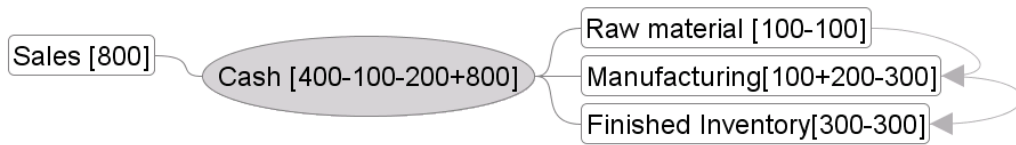
The example will be based upon the value chain of a Simple Manufacturing Co. shown in the block diagram of Figure 2.

Figure 2  
Value Chain Example



The scenario presents one period's activity for a manufacturing Simple Manufacturing firm. The initial balance sheet position will be cash of \$400 and equity of \$400. The firm will: 1) buy raw material; 2) transform the material into a finished product; and 3) sell the product. The raw material will cost \$100. The manufacturing costs will be \$200. The exit sales price will be \$800. A node diagram of the value chain is shown in Figure 3. The numbers in the node describe the cash transaction activity. Anecdotal evidence suggests that students like to be able to trace transaction amounts from accounts through to financial statements. The movement from node to node with a hyperbolic browser would facilitate a "hands on" effect. Similarly, auditors and management could use this application to trace information from node to node in an ERP system.

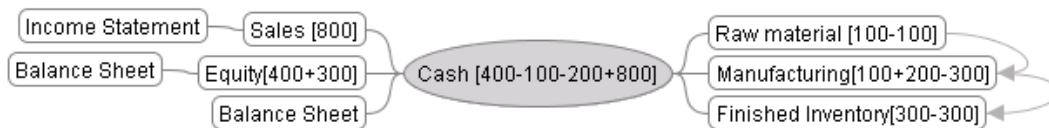
Figure 3  
Node Diagram



### B.FINANCIAL STATEMENTS

This section transforms Figure 3 of the previous section from a value chain accounting information system design into a financial statement reporting format for Simple Manufacturing. First, the accounts are labeled as to their financial statement type. This activity is similar to XBRL tagging of financial statement line items as required in SEC reports. Tags can be included to reference learning objectives and accreditation requirements. See Figure 4.

Figure 4  
Transformation Step from ERP to Financial Statement



Next, Figure 4 transforms Simple Manufacturing Co. into the financial statement presentation format. See Figure 5. Within a hyperbolic browser, one could go back and forth between the ERP value chain format and the financial statement presentation mode for Simple Manufacturing. Also, curriculum knowledge management function can reference the documentation.

Figure 5  
Transformed Financial Statement



## V.CONCLUSIONS AND FUTURE DIRECTIONS

This study demonstrates theoretically and represents by the way of example how ERP accounting information systems and knowledge management can function with a hyperbolic browser. A positive aspect of this synergy is a mapping mechanism that permits movement from node to node of business processes and facilitates the view of large ERP information systems in a way that users can visualize the value chain and financial statement reports with greater clarity. The navigation between nodes could be a significant benefit to curriculum knowledge management. A negative aspect is the cost to superimpose the hyperbolic browser on the accounting information system.

A limitation of this study at this writing is the freeware software program called FreeMind which was used to represent the hyperbolic browser concept. While FreeMind does capture the idea of nodes, it does not have the hyperbolic effects. Future works could incorporate software with the hyperbolic feature.

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