ERP AND FINANCIAL STATEMENT
RENDERING WITH A HYPERBOLIC BROWSER

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Abstract: This study demonstrates the integration of accounting systems and hyperbolic browsers. The combination facilitates education and management of enterprise resource planning (ERP). Auditors also can benefit through a means of tracing activity within an information system as opposed to auditing around one. ERP software product implementation teams could use the hyperbolic browser to display the value chain organization and then transform it into a financial statement reporting format making firm processes easily visible and traceable.

I. INTRODUCTION

This is a developmental work that combines accounting and hyperbolic browsers in one construct. The study will work through the development theoretically and by way of example.   The discussion will focus on the synergy of these concepts.

What do these concepts have in common and what could the combination bring in synergistic benefits? Professors face educational challenges in presenting to students the nature of accounting as it represents flow of events in an ERP value chain and the connection of transactions with the final outcome of financial statements. The problem can be stated as a question: How does one move from the specific (detail) transactions to the general (overall) report? A hyperbolic browser has 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. Another potential application of the hyperbolic software could be for management and auditors in actual businesses. A hyperbolic browser would enable the audit tracing of information through the firm's information system in a way that has never been done before. This audit formulation is in contrast to the common practice of auditing around the information system.

The remaining sections of the development cover: II. background, III. a theoretical overview, IV. an example and V. conclusions with future directions.

II. BACKGROUND

Initial priors about the audience who might benefit from this work are that they likely will have either an accounting background or an information systems background, but not necessarily both. So, let's start with the basic accounting and hyperbolic browser definitions. Accounting is the processing and reporting of entity economic information that will facilitate decision making. As of this writing, the authority on this point is the Financial Accounting Standards Board (Financial Accounting Standards Board 1978) Statement of Financial Accounting Concepts No. 1 Objectives of Financial Reporting by Business Enterprises states "Financial reporting is not an end in itself but is intended to provide information that is useful in making business and economic decisions. … financial reporting should provide information to help investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise ."

Hyperbolic browsers are best defined by their purpose and application. They facilitate the database navigation of hyperbolic space of data trees. The larger the database is … the greater the advantage of a hyperbolic browser. In hierarchical databases of accounting information, as the number of nodes of tree structures become large, the visualization of the information becomes exceedingly difficult. 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 the look of a hyperbolic tree. It is based upon the Poincare disk model (Wikipedia 2010). Notice the reduced view toward the edge. If a particular node near an edge was brought to the center, it would assume a larger size.

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

III.THEORETICAL OVERVIEW

This section provides a theoretical basis in the literature for the application of hyperbolic browsers to accounting. It's the specification of accounting as an ontology that provides a theoretical connection with hyperbolic browsers. Ontology is a branch of philosophical science whose objective is the study of structures and their characteristics in every area of reality.

Previous research (Swanson and Freeze 2009) describes the financial reporting Generally Accepted Accounting Principles (GAAP) in terms of ontology. Financial accounting fits the definition of ontology very well with respect to the structured output of financial statements and the transactions orientation of firm business activities. Aspects of fair value measurement of investments and obligations are less obvious, but an organized description is appropriate in accounting and regulatory pronouncements are structured logically.

Ontology has also used resource-event-agent (REA) as structural mechanism. REA diagrams have been in existence for many years as a tool in audits and system design.   An article (Geerts and McCarthy 2002) has taken REA and expanded it in the context of an ontology. Sowa (Sowa 1999) is their basis for articulating REA as an ontology.   The REA ontology is formulated to extend the granularity (i.e., detailed nature) up to the firm's value chain.

In summary, both general ledger and financial accounting can be organized in terms of ontologies. The next step is to look at the incorporation of ontologies into hyperbolic browsers.   A paper (Eklund, Roberts and Green 2002) presents a hyperbolic browser tool that represents ontologies in general. 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.

IV.DEVELOPMENT

The defining feature of this work is the drawing together of the accounting at the general ledger and overall financial reporting levels into a hyperbolic browser. In the previous section, theoretical literature was identified that justifies the conceptual framework. In this section a physical example is developed. The example works from the detailed transaction level (in subsection A) rolling up into financial statements (in subsection B). This is the process that most medium and large firms follow. Diagrams of a hyperbolic browser will track the information flow.

A.ERP VALUE CHAIN

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

Figure 2
Value Chain Example

Raw Material
Manufacturing
Finished Inventory
Sales
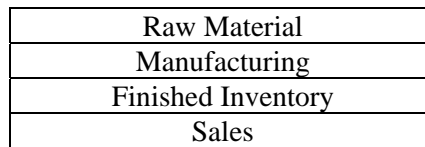
The scenario presents one period's activity for a manufacturing Widget firm. The initial balance sheet position will be cash of $400 and equity of $400. The firm will: 1) buy raw material; 2) transform the material into a finished product; and 3) sell the product. The raw material will cost $100. The 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.
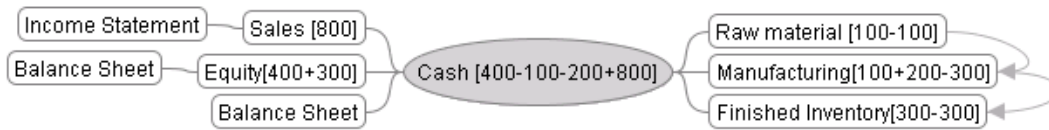
Figure 3
Node Diagram
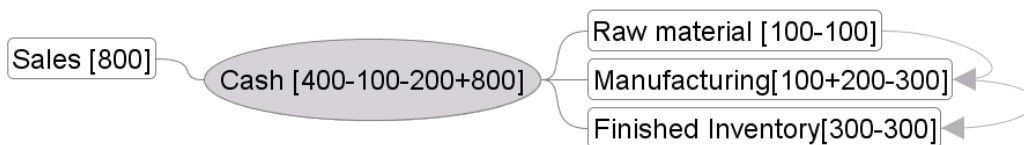
B.FINANCIAL STATEMENTS

This section transforms Figure 3 of the previous section from a value chain accounting information system design into a financial statement reporting format. 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. See Figure 4.

Figure 4
Transformation Step from ERP to Financial Statement

Next, Figure 4 is transformed 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.

Figure 5
Transformed Financial Statement

V.CONCLUSIONS AND FUTURE DIRECTIONS

This study demonstrates theoretically and by the way of example how accounting information systems can be portrayed 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. 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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