

A Model Driven Approach to Accessing Managerial Information: The Development of a Repository-Based Executive Information System – Minder Chen, 1995

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Summary of Paper

Executive Information Systems (EIS), like other information processing systems, cater to the executive level managers. Typically data represented by EIS are at the organization level in lieu of task level. This organizational data can be both internal and external to the organization. EIS designs originated in the mid 1980's. The dynamics of business environments are supported by EISs decision making capabilities. Accurate information and ease of use are essential to the success of an EIS. The criticality of the data and ability to assess the information for strategic decision making makes an EIS essential.

Chen [1] brings forth the concept of repository-based executive information systems (R-EIS) based on the need for a model to guide the executive through the information acquisition aspect. Because the perspective of the data is different at the organization level than at the task level, a means for navigation is needed. He introduces the integrated organization and information systems model (IOIS) as a basis for underlying information systems. The IOIS model is used as a guide for user interfaces and to simplify the data access to operational databases. The access methods and techniques used for existing information systems are not conducive to the high level information gathering needed by executive level management.

The rise of EIS draws attention to the delivery of information instead of the application itself. There are four basic functions brought forth by Rockart and De Long [2]: communication tools; organizing tools; data and status access tools; and decision analysis tools. Aside from the basic functions mentioned above, Chen [3] addresses five issues concerning EIS as follows: managers are overloaded with information; there is no mechanism to support organization learning; there is no explicit model or structure to organize managerial information; the consistency and unavailability of information in EIS often result from inadequate business systems design; and there is no mechanism to ensure integration of an enterprise-wide EIS implementation.

The need for an R-EIS stems from executive level managements need to model, launch applications and retrieve information directly. "The navigation path recorded will be used as a context within which executives can better understand the information they receive [4]." The architecture of R-EIS is built off of the CASE structure. The key components of the R-EIS architecture are: integrated organization models with IS models, the repository integrates multiple development tools and support for the development of the targeted IS and delivery of information to executives. There are four subsystems within the R-EIS architecture: target information systems, developmental tools such as CASE and DSS generators, a repository system of both a specialized database and knowledge base and a model-driven user interface.

The contents of the R-EIS include meta-data and the structure is known as a meta-model. The objective is to "extend the use of repositories from applications development to information delivery. It integrates EIS and CASE through an IOIS model stored in the repository. By extending existing IS models to incorporate organization models, it becomes possible to integrate CASE and EIS so as to support both IS development and delivery [5]."

Both organization models and mental models encourage the EIS to become part of the corporate culture. The mental model promotes a good conceptual model of the business and encourages a common view among executives and managers. The organizational model aids with business

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processes and complements goals and objectives. Both models aid and influence problem solving and decision-making. “The benefits realized from this collaborative environment foster a team spirit among executives. Managers can easily communicate and coordinate, share ideas, and learn from each other because they have a common big picture of the organization [6].”

Research Questions Addressed by Paper

The continued increase of information availability has enabled senior managers to have information readily accessible to them. Ensuring a reliable, efficient means of delivery is best handled through EIS. Finding the right EIS to meet the needs of executive level management is an ongoing challenge. Chen [7] addresses this challenge with his prototype system called Repository-based Executive Information System (R-EIS). The R-EIS is proposed to integrate with existing information system applications. The objective of the R-EIS is to access existing applications directly through a IOIS model from a business perspective. This model-driven approach to obtain information will assist the decision-making process. A secondary benefit is knowledge gain of organizational processes through navigation of large information bases.

Contribution of the Paper

Chen’s [8] “Repository-Based Executive Information System”, brings forth a design that facilitates access to repository information at the managerial level. This gateway allows for information retrieval in a manner that was previously not possible. The ability to navigate between organization models and information models is a benefit of R-EIS. The 6 benefits of R-EIS that Chen identifies are: support for continuous business improvement based on performance measure; improvements to the business reengineering process; easy navigation and exploration of the IOIS model; guidance from the development of the IS models; establishment of a common mental model of business to support organizational learning; and a basis for delivering business context information. In 1995 at the time of the article, this was a prototype system and a working R-EIS was underway.

Chen [9] believed that while there are some disadvantages of R-EIS, companies should recognize the importance of information delivery and the usefulness of organization modeling. The concept of fostering collaboration and increasing communication is the basis for R-EIS. Through the communication process and information access, learning is realized. The organization model accomplishes this through shared visions, goals, objectives and strategies. Included are business processes both independently and as they relate to each other.

Integration of Course Concepts

There are several aspects that come into play with an architecture such as R-EIS. The two aspects brought forth throughout the course are: human behavior and media richness. Chen relates these two aspects throughout the article while providing a different perspective. Authors such as Daft and Lengel [10], Benbasat and Taylor [11], and Zwass [12] bring forth theories that contribute to the understanding of Chen’s article.

Daft and Lengel’s [13] organizational requirements and media richness article can be construed as a foundation for R-EIS. Chen relates structural design with the importance the media rich

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information needed for EIS. Daft and Lengel's [14] focus on uncertainty and equivocality and their influence on information processing within an organization support the purpose of EIS.. Their objective was to "attain an acceptable level of performance [15]". This objective supports Chen's argument that there is a desire to navigate through screens data of tabular or graphical form but can be tedious depending on the reliability and structure of the data. Chen states "there is no underlying model to guide the navigation of the diverse data and applications used by executives. A repository based and model-driven EIS that captures integrated organization and information system (IOIS) models of an enterprise is therefore needed [16]."

Peppard [17] and Zwass [18] alike, reflect the technological changes that have resulted from media richness theory. Both suggest that, with respect to leveraging knowledge, groupware and electronic communications come into play. Additionally mentioned is the increased uncertainty and intricacies resulting from global markets and the critical success factors. These factors necessitate an organizational structure for decision-making based on knowledge. Addressing strategies such as synergy across business units and a need for global business processes also play an important role. Zwass states "EISs serve people whose time is at a premium and who are responsible for the long term vision of the company's future in the competitive marketplace. These executives develop long-term strategic plans for the company and exercise strategic control by monitoring the organization's performance [19]."

Zwass shares a similar perspective to Chen on principle characteristics of EIS. Mentioned are examples such as having a variety of databases, both internal and external, to access through a uniform interface and also functional to display details such as tabular and graphical information. Capabilities such as "drill downs" are also mentioned. It is important to be able to access detailed information as needed. Both Zwass [20] and Chen [21] alike refer to the dependence of critical success factors methodology (CSF) developed by John Rockart [22] in 1979 as a basis for understanding EIS. They both compare CSF to that of strategic business objectives methodology and a more company-wide perspective. Chen carries these concepts one step further by drawing entity relationship models and mental models into the findings.

Another aspect of EIS is based on human behavior. Benbasat and Taylor's [23] perspective are on the behavioral aspects of information processing and encompasses various models affecting the processing behavior of humans. Their conceptual approach with regards to the importance of human behavior is essential when addressing usability. The four aspects of human information processing presented by Benbasat and Taylor [24] are discussed as a means to improve MIS systems design. Typically, enhancing the ability of individuals who make decisions based on information from multiple sources and streamlining information sources to aid with large amounts of information often available, contributes to a more effective design.

Zwass also contributes to the behavioral aspects by identifying the increased availability of information and the concern for information overload of the user. As Zwass [25] mentions, "we are drowning in data but need information". Information overload isn't only having too much information but not knowing how to extract and manipulate the needed information. Too often, more information than is requested is returned to the user. Getting the right information to the decision maker can expedite the problem-solving situation. As presented by Zwass "The problem we're facing is that the role information systems play in an organization has evolved over time

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[26].” The rate at which changes have taken place has made it difficult for the decision maker to keep up. Zwass also indicates “We also rely on these systems to help manage increasingly complex interactions within the company and throughout the “extended organization” consisting of our firm, its business partners, customers, and suppliers [27].” Realizing internal growth within a corporation is often challenged by cognitive strain. A much-needed change may require additional training and implementation considerations to accommodate the limitations of the end-user.

Encouraging usability is an aspect that also benefits EIS and concepts such as R-EIS. With the constant changes in business globalization and mergers or acquisitions, the “extended organization” influences the importance of usability and functionality. Zwass mentions that sharing of databases and information globally also brings to light the most important asset of an enterprise; people [28]. People often work in global teams and need to be able to communicate and overcome language barriers. Usability methods address the limitations these barriers create and also allow an opportunity for changes in predesign and prototyping.

Critique/Analysis of the Paper

Executive Information Systems are continuously changing with technology. Finding a viable solution that leverages existing systems not only is efficient but contributes to data integrity. While Chen’s prototype and theory on R-EIS appears practical, current technology suggests that other alternatives have been introduced. The foundation presented based on the information model and organization model are beneficial and are portable to any technology that addresses EIS. Chen presents an understanding on the importance of content, the models themselves, and information delivery and data.

Chen’s article is practical yet theoretical and informative although rather lengthy. The article’s template and Chen’s writing style support his view of structural design making the document easy to follow and usable by more than one audience. His tone and explanations of each component delve into not only EIS and his prototype of R-EIS but also overlap with the theory behind his prototype. The breakdown and integration within the critical success factors methodology, as well as strategic business objectives is clear and concise. Chen also brings forth topics for further research and presents disadvantages resulting from his study and prototype. However, his presentation does not hinder the acknowledgement that a system such as the proposed R-EIS is much needed and beneficial.

Lessons Learned

Through Chen’s R-EIS prototype, he brings an awareness of EIS and the possibilities of using data repositories. Without an extensive background of data repositories, the concept of where EIS fit within information processing systems is not clear. Chen reiterates the importance of having the right system and processing capabilities for executive level management. There is also a belief that management will learn more about organizational processes through navigation of the model. Management often doesn’t understand organizational processes and therefore influences their judgment on decision-making.

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While the article dates back to 1995, EIS are still a novelty. Executive level management too often doesn't have accurate data and tools to work with. Limitations such as bandwidth or dial-up modems to access EIS are still obstacles despite technological advances. The sheer volume of data to be accessed and ongoing support of old legacy systems offset technological advances with respect to hardware and processing capabilities. More effort needs to be put forth to address data integrity and media richness to provide a foundation for repositories and EIS alike.

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