



AN INTRODUCTION TO INTEGRATED DATABASE SYSTEMS

The purpose of this publication is to make available to industry the results of research conducted by the Construction Industry Institute (CII). The publication does not necessarily represent the views of CII member companies, but is offered as a contribution to the industry.

CII was founded in 1983 to improve the cost effectiveness of the nation's largest industry. The members, who represent a broad cross-section of owners and contractors, believe that many of the problems that limit cost effectiveness are common ones, and that real improvements can be best accomplished in a cooperative environment with the benefits being shared by the construction industry at large.

CII uses the acronym TOPICS to describe the research effort. TOPICS signifies the six research thrust areas: Technology, Organization, People, Information, Controls, and Sigma (meaning others). The current task forces for each area are listed below.

Technology

- Advanced Technological Systems
- Computer Integrated Design & Construction
- Design for Safety
- Environmental Remediation Technology
- Technology Strategy
- Technology Survey

Organization

- Partnering II
- Project Change Management
- Pre-Project Planning
- Project Organization II
- Project Team Building

People

- ADA Impacts
- Continuing Supervisory Education
- Drug-Free Workplace
- Multi-Skilling
- Zero Accidents

Information

- 3D CAD Link
- International Construction
- International Standards
- Owner Engineering Organization
- Project Team Communications

Controls

- Change Order Impacts
- Contracting, Phase II
- Dispute Prevention and Resolution
- International Standards
- Predictive Tools
- Quality Performance Measurement
- Schedule Reduction
- Total Quality Management

Sigma

- Barriers to Implementation
- Insurance
- Piping Function
- Retrofit Projects
- U.S. Navy Demonstration Project
- Utility Pilot Projects
- Workers Compensation

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An Introduction to Integrated Database Systems

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Executive Summary

Electronic technology in the construction industry today is entering a new era of advancement and sophistication. Management and implementation of the new technologies are becoming integral parts of company strategic plans. One emerging concept is the integration of systems and data structured in a manner compatible with the sharing of information both internally and externally. This philosophy is referred to as Integrated Database Systems. Companies and the industry are being driven in this direction by the potential for dramatic improvements in productivity. This technology holds the promise of speeding the engineering, procurement, construction, operation and maintenance process, while improving the quality of and access to information.

Who should read this publication? Industry participants are aware that the electronic data management arena holds major issues for construction. CII has established broad industry goals for the Year 2000: reduced costs, reduced schedules, and improvement in safety. These goals cannot be achieved, the task force believes, without a clear understanding of electronic data issues, including integrated databases systems.

This CII publication provides examples of approaches and ideology in the implementation of integrated database systems within our industry. The examples display some of the issues that are being faced in the selection of hardware and software platforms in a changing electronic environment. A pressing need is for standardization—to allow for the internal as well as external sharing of information. Today, this issue is being addressed through development of ANSI standards for Electronic Data Interchange (EDI) and additional standards under the Standard for the Exchange of Product Data (STEP) effort.

Different paths are available to achieve data integration, barriers can be overcome, and hardware and software integration is taking place through the use of file conversion techniques and the synthesis of computer graphics with integrated databases. The technological result is the advent of truly advanced capabilities that will enhance productivity.

Benefits include improved access to project data, more efficient hardware utilization, accelerated drawing production, reduced rework, the ability to exchange information in digital format, and visual access to project information.

Additional information may be obtained in two companion CII publications produced by the Electronic Data Management Task Force: Publication 20-1, *EDI: Concepts and Applications* and Publication 20-3, *Achieving an Integrated Data Environment: A Strategic Initiative*.

Introduction

Construction industry automation has evolved through several eras of development, from mainframe computers run solely by data processing specialists to current technology that employs personal workstations on virtually every type of project task. Engineering companies utilize extensive databases and CAD systems, construction companies place sophisticated systems at project sites, and owners are expressing increased expectations for effective electronic data management.

Current systems in place throughout much of the industry provide the technical capabilities to achieve the ideal—the integrated project where information efficiently flows among all members of the project team. As identified in Figure 1, information created in each project phase builds a database that is required in subsequent phases. A primary goal of effective electronic data management is to provide each individual with efficient access to this data.

The sharing of data produced by individual team members is the concept embodied in the “Integrated Database” (IDB).

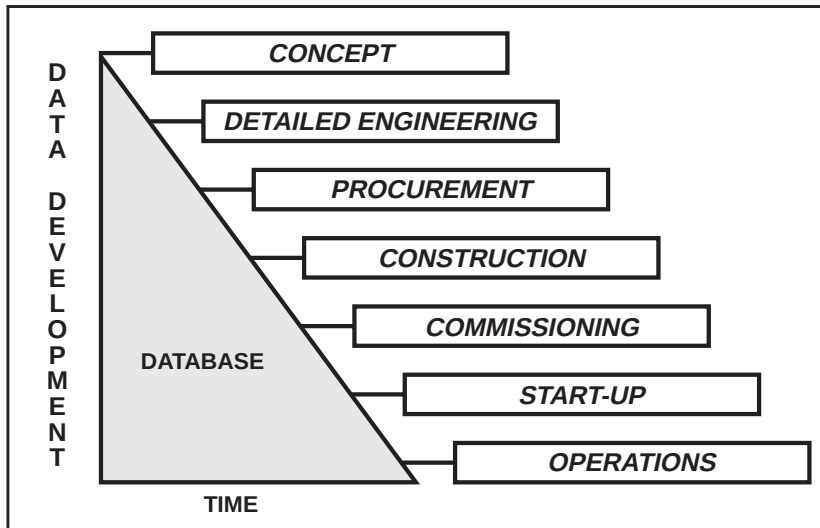


Figure 1. Data Development

From 1983-1986, the National Research Council Building Research Board sponsored a series of annual workshops at the National Academy of Science Study Center in Woods Hole, Massachusetts. The purpose of the workshops was to investigate the IDB concept and its long-range implications for the building industry. These workshops were attended by experts in construction, engineering, and computer technology.

At the initial Woods Hole Workshop in 1983, many computer-based strategies for improving construction data processing were discussed. The participants concluded that an integrated database approach in the construction industry would not only prevent the loss of much valuable data during the life cycle of a facility, but would enhance the accessibility and use of that data. It was decided that because 85-90 percent of a building's life cycle costs are incurred after construction, the IDB must be designed with facility management as a major component.