

1983

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Recommended Citation

Colter, Mel A., "A Comparative Examination of Systems Analysis Techniques*" (1983). *ICIS 1982 Proceedings*. 1.
<http://aisel.aisnet.org/icis1982/1>

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A Comparative Examination of Systems Analysis Techniques*

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ABSTRACT

The systems industry has now experienced almost three decades of growth and development. In that period, a large number of analysis tools and techniques have been proposed to aid the development process. Early systems were supported by analysis techniques which had been used for some time in precomputer systems. Next, the precomputer techniques were modified to meet some of the unique requirements of computer based systems. Succeeding generations of analysis tools continued to provide improved support to the analysis process. In recent years, a series of structured analysis tools and techniques has been introduced to the industry.

At this point, a large number of competing analysis techniques exist and are widely used. However, they are not clearly understood by many practicing professionals. They tend to be incomplete, requiring careful evaluation and integration to result in coherent analysis processes. Unfortunately, the literature on the subject tends to concentrate on the strengths of individual tools, often implying that a single analysis process can address all needs.

In reality, all analysis tools and techniques are incomplete. While specific approaches provide support for specific analysis problems, none cover all of the system issues of interest. Traditional techniques tended to provide good detail on input and output detail. In addition, traditional analysis approaches clarified flows of information through the organization. Later approaches considered data storage and provided tools to represent procedural system aspects. Structured techniques concentrate on the structure of data flows, data, and control. Unfortunately, modern analysis approaches exhibit improvements in some areas of analysis while neglecting some of the strengths of older techniques.

This paper presents a comparative examination of analysis techniques to aid practicing professionals in the choice of tools for development efforts. The comparison is supported by a set of dimensions which represent the various system

*This paper is forthcoming in the MIS Quarterly.

aspects of interest during analysis. These dimensions include considerations of system structure, functions, procedure, input detail, output detail, and mechanisms responsible for functions. In addition, analysis techniques may be compared in terms of their ability to support high and low level analysis and to support effective communication between systems professionals and their customers.

The comparison of analysis techniques clearly shows that traditional approaches failed to consider system structure issues. However, modern tools fail to consider some of the traditional issues of interest. For example, most of the structured analysis methods fail to provide any support for I/O detail. In addition, almost all of the currently popular analysis techniques assume that all functions will be implemented in software. Only SADT and some of the older techniques support the analysis of mechanisms responsible for functions. Current man-machine concerns make mechanism analysis critical.

The comparison of techniques indicates a need for the combination of multiple tools to provide complete coverage of the issues of interest during analysis. In the comparison, the strongest approaches were those which explicitly required the use of multiple tools. For example, HIPO is a package which is quite complete, despite its age. The comparison process provides sufficient detail to support the choice of techniques which can be combined into complete packages.