> ## : Is the traditional Sprague DSS still relevant?

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In 1980, Ralph Sprague, a long-time Professor at the University of Hawaiʻi at Mānoa, wrote a frequently cited foundational article about computerized decision support. He defined what can be termed a "Sprague DSS" that has three components: 1) a data base, 2) a model base, and 3) dialog generation and management software. The purpose of a "Sprague DSS" was "to support the decision-making activities of managers." Sprague's invited article in MIS Quarterly is titled "A Framework for the Development of Decision Support Systems." Google Scholar statistics show 1416 citations as of December 2017. Is an article written almost 40 years ago still relevant to analytics and decision support research? Is the Sprague DSS framework still worth discussing? **YES!**

In a May 2007 interview, Professor Tom Davenport, a major proponent and advocate for analytics and data science, was asked about the concept "Decision Support System". Davenport noted "Well, I don't really use the term much anymore, since most business people now use the term 'business intelligence'. But in any case I would define it as IT applications that help organizations to make decisions. I think it's only the 'support' word that is becoming obsolete, as systems are increasingly capable of actually making automated decisions, as opposed to just supporting humans in doing so."

Recent advances in Artificial Intelligence, data visualization, and analytics have broadened computer use in decision making, but is the traditional Sprague DSS obsolete? Is Sprague's DSS definition, the notion of "support", and his 3 component framework still relevant to building and studying computerized decision support systems? or Is the Sprague concept of a DSS the "Model T" of computerization of decision making? Computing has advanced so significantly that Sprague's work has limited relevance to actually building modern DSS, but the simple 3 component framework should continue to influence our thinking about decision support. The idea of decision support for managers is not obsolete.

According to Pritchett (2017) in a memorial tribute posted at the AIS website and to Power (2008), Sprague's framework article on Decision Support Systems was "one of the 25 most cited works in the IS field in the 1980s and at the time he was regarded as one of the ten most influential authors in the field of Management Information Systems." What is the current relevance of Sprague's DSS framework and ideas?

The following two sections discuss Pro and Con arguments for the continued relevance of the Sprague DSS framework:

Pro Arguments

Many models that use historical data are still in use to support decision making and new ones are likely to be built. For example, forecasting and optimization models are commonly used analytical tools. Sprague identified, studied, and documented early model-driven DSS.

As Sprague and others have argued, in many poorly structured or semi-structured decision situations, a human decision maker is still needed to exercise judgement and make a choice. The notion of support remains relevant.

Managers are expected to take responsibility for decisions and yet research shows that people have biases that computerized DSS may be able to reduce. The need for model-driven DSS still exists.

Finally by way of rebuttal to those who would replace human decision makers, relying on AI software to make all managerial decisions is not feasible today nor is that goal in my opinion desirable.

Con Arguments

Computized decision making is much broader than it was conceptualized in 1980. The Sprague DSS is too narrow as a DSS framework. Other categories and types of decision support exist, including "smart" DSS that use AI and knowledge to support decision makers.

Decision support conveys the idea that managers need help to make good decisions and that a computer software system can provide decision-making assistance. That idea or notion meets resistance from both those who question use of computer support to help make decisions and from those who believe AI software can make better decisions than people.

A DSS provides many types of support including model-driven support. The Sprague framework reflected the technology limitations of the late 1970s.

Sprague DSS forced a focus on supporting situations that could be structured and quantified. Focusing too much on quantitative models ignores important decision factors and distorts decision making.

Finally, managers want "facts" rather than "What If" speculation. Sprague DSS put too much emphasis on manual manipulation of decision parameters and "What If" analysis.

Argument Summary

Some might argue Sprague's (1980) framework article has little or no relevance to future decision support research. Perhaps the article was more important in 1980 when we knew little about supporting decision makers, than today. The ideas are somewhat dated and the architecture and vision is a hold over from the mainframe computing era. Now is the time to remember the legacy DSS literature and to create a new decision support paradigm that recognizes the pervasive impact of AI and the Cloud upon how we live and work. The time to think in narrow, component, compartmentalized ways about decision support is past. In many cases people shouldn't be making routine, repetitive decisions. Our best and brightest managers should make the "wicked", non-routine decisions with the help of computerized decision support and analytics.

A Holistic View of Sprague (1980)

Sprague's 1980 article is about much more than the "Sprague DSS". The framework may be incomplete or overly simplistic, but the article contains useful ideas about many topics ..."

First, Sprague defined decision support systems, "DSS is a class of information system that draws on transaction processing systems and interacts with the other parts of the overall information system to support the decision making activities of managers and other knowledge workers in the organizations (p.5)."

Sprague identified 3 technology levels for DSS that remain relevant: 1) specific DSS, 2) DSS Generators, and 3) DSS tools.

1) A specific DSS. Sprague states "The system which actually accomplishes the work might be called the Specific DSS. It is an information systems 'application,' but with characteristics that make it significantly different from a typical data processing application. It is the hardware/software that allows a specific decision maker or group of decision makers to deal with a specific set of related problems (p.6)"

2) DSS Generator. Sprague notes "The second technology level might be called a DSS Generator. This is a "package" of related hardware and software which provides a set of capabilities to quickly and easily build a Specific DSS.(p. 6)"

3) DSS Tools. Finally, according to Sprague "The third and most fundamental level of technology applied to the development of a DSS might be called DSS Tools. These are hardware or software elements which facilitate the development of a specific DSS or a DSS Generator.(p.7)" The sophistication of tools for decision support development have improved dramatically since 1980.

These technology levels have evolved and grown more sophisticated, but the distinction remain useful.

Sprague argued for a "new" development approach for DSS called Iterative Design. He argued "A DSS needs to be built with short, rapid feedback from users to ensure that development is proceeding correctly. It must be developed to permit change quickly and easily. The result is that the most important four steps in the typical systems development process- analysis, design, construction, implementation- are combined into a single step which is iteratively repeated. .... this is different from the concept of 'prototyping'; the initial system is real, live, and usable, not just a pilot test. (p.10)"

Sprague proposed that "In the broad sense, the DSS is an adaptive system (p. 10)." The implications and potential of categorizing DSS as adaptive systems have not been adequately explored. Sprague explains an adaptive system based on Simon's ideas. He notes "Simon describes such a system as one that adapts to changes of several kinds over three time horizons [34]. In the short run, the system allows a search for answers within a relatively narrow scope. In the intermediate time horizon, the system learns by modifying its capabilities and activities, i.e., the scope or domain changes. In the long run, the system evolves to accommodate much different behavior styles and capabilities (p. 10-11)."

Also, Sprague specified performance requirements for DSS. He wrote "It is likely that no Specific

DSS will be required to satisfy all six of the performance requirements given here. In fact, it is important to recall that the performance criteria for any Specific DSS will depend entirely on the task...(p. 11)" Are the performance objectives/requirements still relevant? Are they complete? "The performance objectives show the types of decision making to be served by, and the types of support which should be built into, a DSS as it is developed (p. 23)." It remains important to study performance requirement for decision support.

Researchers have not adequately addressed Spague's criticisms of DBMS. He argued "Better ways are needed to handle and coordinate time series data as well as mechanisms for capturing, processing, and tagging judgmental and probabilistic data. Better ways are also needed for extracting data from existing files and capturing data from previously non-computerized sources."

Sprague specified 5 issues for the future? Have we really dealt with them? Have technology changes altered our answers to the questions Sprague raised. He noted "The issues given here, phrased as difficult questions, seem to be the ones that must be dealt with quickly ..." What's a DSS? What is really needed? Who will do it? How should it be done? How much can be done? "Systems analysts have always had a little trouble with humility, but the DSS process requires a healthy dose of modesty with respect to the ability of technology to solve all the problems of managers in organizations (p. 23)."

Sprague's writings including his 1980 DSS framework article remain useful and relevant to future research. Please Rest in Peace Ralph Herbert Sprague (1938-2017). Your DSS legacy lives on.

References

Power, D., "Tom Davenport Interview: Competing on Analytics", DSSResources.COM, 05/27/2007 at URL http://dssresources.com/interviews/davenport/davenport05272007.html.

Power, D., "Decision Support Pioneers," DSSResources.COM, 06/26/2008 at URL http://dssresources.com/history/pioneers/pioneerslist.html

Pritchett, B., "IS Community Mourns Loss of Pioneer Ralph Sprague," AIS.org/News, May 3, 2017 at URL http://aisnet.org/news/343547/IS-Community-Mourns-Loss-of-Pioneer-Ralph-Sprague.htm.

Sprague, R.H., Jr., "A Framework for the Development of Decision Support Systems," MIS Quarterly, Vol. 4, No. 4 (Dec., 1980), pp. 1-26.

Please note that it is difficult to find personal information about Ralph Sprague using a Google search. I could not locate an official biography. His birth year and middle name is inferred from a search at beenverified.com and https://www.whitepages.com/name/Herbert-Sprague/HI.

Sprague's Decision Support Pioneers listing at DSSResources.com states "RALPH H. SPRAGUE, JR., Professor of Information Systems in the Department of Information Technology Management, College of Business Administration, University of Hawai'i at Manoa. He received a Ph.D. from Indiana University in Quantitative Business Analysis. His framework article on Decision Support Systems was one of the 25 most cited works in the Information Systems field in the 1980s. A citation analysis during that time showed that he was one of the ten most influential authors in the field of Management Information Systems. His 1982 book on DSS, co-authored with Eric Carlson, provides an applied theoretical foundation for the field." Check URL http://dssresources.com/history/pioneers/pioneerslist.html .

Culnan, M . and Swanson, E . "Research in Management Information Systems, 1980-1984: Points of Work and Reference," MIS Quarterly, Volume 10, Number 3, 1986, PP. 289-302 .

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