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METROLOGICAL SUPPORT OF INFORMATION MEASUREMENT SYSTEMS

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Abstract
In this article, the main trend determining the development of measurements in the field of automated production is the transition to automatic control using adaptive models, as well as the use of more effective control and information-measurement systems in the field of mobile metrology. This means that today the value of metrological characteristics of measurement channels begins to increase sharply, taking into account not only the metrological characteristics of the blocks included in the measurement channel, but also the influence of the channels on each other. On the basis of mobile metrology, many control and measurement works are carried out in modern industrial production, for example, in oil fields and other technological fields. This article mainly presents opinions on the study of information and measurement systems.

Keywords Measurement system, industrial production, characteristics, control, model, data analysis technology, mobile metrology, virtual technologies, comparison and calibration, attestation and accreditation processes, manipulation through intelligent measuring devices.

INTRODUCTION

The rapid technological evolution of recent years in the field information and communication technologies have made it possible to form a significant backlog in terms of developed software and hardware infrastructure that supports the accumulation and constant replenishment of data archives of various natures and purposes.

Increasing competition in various areas of human activity - business, medicine, corporate management, etc. – and the complexity of the external environment make approaches to the expert use of existing data to improve the validity and efficiency of adoption management decisions.

At the same time, it is not always possible today to directly effectively use a well-developed and well-known apparatus probability theory or mathematical statistics without taking into account the characteristics of a specific subject area, computer science, computational complexity of known and common algorithms (including details of data storage, transmission and processing, machine learning algorithms, etc.), the current and future state of information systems and technologies.

METHODS

Unit systems and dimensions emerged in the late 19th century. However, efforts to adapt these ideas for use in modern digital systems are proving a challenge. We provide an interpretation of units and dimensions that clarifies the main reasons for difficulties. We then suggest how a digital system would provide adequate support for quantities and units. A layer of metrological information is envisaged that would track details and allow familiar unit formats to be rendered. Three independent aspects of the data should be captured: 1) the quantity; 2) the measurement scale, scale type and conversion functions; and 3) the semantics of numerical data [1].

One of the most well-established methods to integrate research findings and assess the cumulative knowledge Measuring information systems success Stacie Petter et al 239 European Journal of Information Systems within a domain is a qualitative literature review (Oliver, 1987). This method allows a researcher to analyze and evaluate both quantitative and qualitative literature within a domain to draw conclusions about the state of the field. As with any research technique, there are limitations.

The primary limitation with this approach is that when conflicting findings arise, it becomes difficult to determine the reason for the conflicting results. Some also perceive that because the literature review is qualitative, it is subjective in nature and provides little'hard evidence' to support a finding. To counter these shortcomings, the research technique of meta-analysis has become quite popular in the social sciences and now in IS. Meta-analysis is an interesting and useful technique to synthesize the literature using quantitative data reported across research studies.

The result of a meta-analysis is an'effect size' statistic that states the magnitude of the relationship and whether or not the relationship between variables is statistically significant. This approach too has its limitations. A key limitation is the need to exclude studies that use qualitative techniques to examine success or studies that fail to report the information required for the statistical calculations for the meta-analysis.

While the meta-analysis produces a quantified result regarding the relationship between two variables, the need to exclude some studies may not present a complete picture of the literature. Furthermore, a meta-analysis does not examine the direction of causality, because the effect size is an adjusted correlation between two variables [2].

There have been meta-analyses examining one or more of the elements of IS success therefore, this paper seeks to obtain a different, qualitative view of the literature to answer a different set of research questions. While a meta-analysis is aimed at answering the question:'Is there a correlation between two variables?', a qualitative literature review is better equipped to explain how the relationships have been studied in the literature, if there appears to be support for a causal relationship between two variables, and examines if there are any potential boundary conditions for the model.

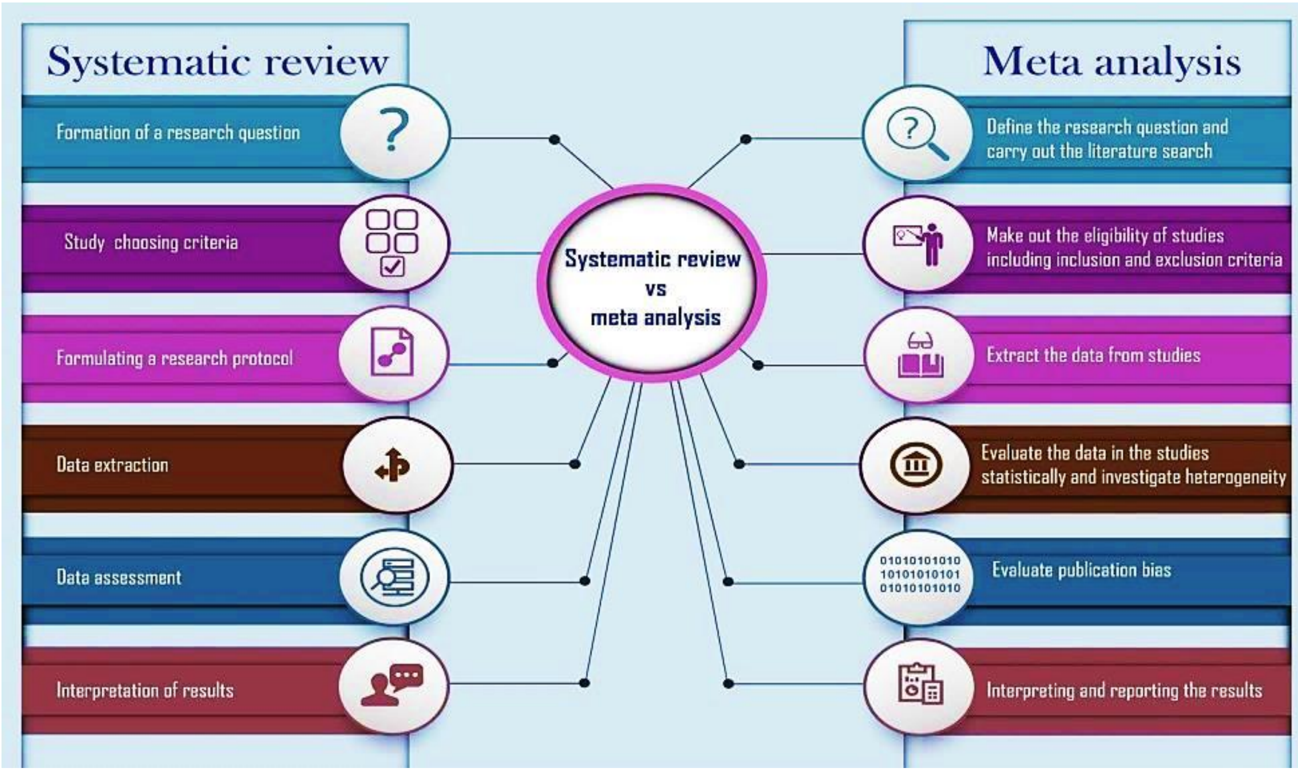

Figure 1. Meta-analysis vs Systematic review

It means combining the results of several studies using statistical methods (that is, quantitative methods of assessment) to test one or more interrelated scientific hypotheses.

A meta-analysis uses either primary data from original studies or summarizes published (secondary) results from studies devoted to one problem. Meta-analysis is a common, but not required, component of a systematic review of empirical studies.

RESULTS

Intelligent measurement systems are capable of performing all measurement and control functions in real time. This allows “high level” measurement and control functions to be carried out without the need for large computers. When operating autonomously, such an IC provides continuous measurements and control of specified parameters, data collection and signal processing [3].

Intelligent measuring systems have significant advantages over traditional ones, namely:

- high speed of control loops for measurement processes, as well as high speed of data acquisition;
- versatility - standard interfaces provide easy connection to any systems and equipment;
- high reliability at each system level - the use of universal methods ensures trouble-free operation;
- interchangeability; Since intelligent systems are standard devices, individually programmed for their specific functions, each of them can be replaced by another device of the same functional purpose; each system can be considered as a backup for any type of system of the same class, which reduces the number of additional redundant measuring, monitoring, control and adjustment equipment and minimizes the emergency period in the unlikely event of failure of any element.

DISCUSSION

Before implementing a new, newly invented apparatus (device), or a new version of improving the circuits of a device, you need to make sure that the updated device will work better than the old one. For these purposes, the designers of a new device or device always began by creating some kind of prototype or mock-up, which would allow them to verify the functionality or advantages of the new device over the old one without great expense[4]. Professionals often call the creation of such a prototype a process of physical modeling.

With the advent and widespread use of professional computers, individual companies have developed computer programs that allow computer (mathematical) modeling of various electronic circuits.

Physical modeling is associated with large material costs, since it requires the production of models and their labor-intensive research. Often physical modeling is simply not possible due to the extreme complexity of the device, for example in the design of large and ultra-large integrated circuits. In this case, they resort to mathematical modeling using computer tools and methods.

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