



# Supporting self-evaluation in local government via Knowledge Discovery and Data mining

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## ABSTRACT

The business sector has already recognized the importance of information flow for good management, with many businesses adopting new technology in data mining and data warehousing for intelligent operation based on free flow of information. Free flow of information in government agencies is just as important. For example, in child welfare, entities that fund social services programs have increasingly demanded improved outcomes for clients in return for continued financial support. To this end, most child welfare agencies are paying more attention to the outcomes of children in their care. In North Carolina, many county departments of social services have successfully adopted the self-evaluation model to monitor the effects of their programs on the outcomes of children. Such efforts in self-evaluation require good information flow from state division of social services to county departments of social services. In this paper, we propose a comprehensive KDD (Knowledge Discovery and Data mining) information system that could upgrade information flow in government agencies. We present the key elements of the information system and demonstrate how such a system could be successfully implemented via a case study in North Carolina. The next generation infrastructure in digital government must incorporate such information system to enable effective information flow in government agencies without compromising individual privacy.

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## 1. Introduction

In recent years, government agencies have been under pressure to be more effective and are increasingly held accountable for outcomes. To support this new mode of operation, resources are being set aside for quality evaluations that go beyond simple counts of services provided. For example, in child welfare, the Adoption and Safe Families Act (ASFA) of 1997 identified a national set of outcome measures that can be used to gauge state and national progress in reaching the goals of child safety, permanency, and well-being. A key factor in such evaluations is the free flow of government information, which is used to evaluate the operations of government organizations and measure real outcomes that result from its services while still protecting individual privacy. With advances in information technology, the business sector has already realized the importance of effective information flow for good management (Gavirneni, Kapuscinski, & Tayur, 1999) and many have implemented large-scale information systems to enable information flow. The next generation infrastructure in digital government must also enable effective information flow in government agencies without compromising individual privacy.

A good example of the need for effective information flow in government agencies is demonstrated in the use of self-evaluation in child welfare agencies. Self-evaluation is a form of empowerment evaluation that is collaborative and participatory. Through self-evaluation, a county social services agency, with the assistance of experts, can design, monitor, and improve indicators that ultimately improve the outcomes that are important to their local community. A key element in the self-evaluation efforts is the availability of timely and accurate data that appropriately measure the outcomes of interest. In the case of social services agencies, comprehensive data on families and children served by the agency is required. However, many of the local agencies lack the resources to collect and analyze the data for such evaluations. In addition, as many of the local agencies in a state would have similar goals, much effort would be duplicated if each local agency built its own capacity for such data analysis. Furthermore, it would be easier to have consistency across similar outcomes in different local governments if the state provided the technical assistance for such efforts (Usher, Wildfire, & Schneider, 2001).

In North Carolina, a KDD information system was built to support self-evaluation efforts at the local level. In collaboration with the North Carolina Department of Health and Human Services (NC-DHHS), the Jordan Institute for Families at the School of Social Work at the University of North Carolina at Chapel Hill (UNC-CH) built an information system to publish comprehensive outcome measures at the local level for child welfare. The project built a dynamic website

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that contains information on various state and federal outcome measures for child welfare for all 100 counties in North Carolina. These outcome measures are provided at various units such as county, groups of counties, state, as well as different time periods and sub-categories like age, race, and gender. Counties can use this vast amount of information to construct their own self-evaluation system and monitor their progress from different perspectives.

In this paper, we propose a comprehensive KDD (Knowledge Discovery and Data mining) information system that could upgrade information flow in government agencies via a case study in North Carolina. We first describe the different policies in child welfare that have played a key role in its success as well as the details of how information is being used. Next we will demonstrate how effective information flow among state and county government agencies has empowered both to better serve their communities via self-evaluation. We then follow by presenting the key elements of the information system and demonstrate how similar systems could be successfully implemented. Such a KDD information system should be an integral part of the next generation information infrastructure in digital government.

The remainder of the paper is organized as follows. Chapter 2 provides an overview of the related works in KDD and self-evaluation. In Chapter 3 we introduce the language used in child welfare with a full discussion of child welfare policies and how it uses technology and information to better serve its community. Chapter 4 demonstrates the use of self-evaluation in Guilford County, NC. Chapter 5 details the KDD information system built for the project highlighting the important technical details. And finally, Chapter 6 concludes with a discussion of lessons learned and future works.

## 2. Related works

### 2.1. Knowledge Discovery and Data mining (KDD)

KDD is the area of computer science that tries to generate an integrated approach to extracting valuable information from data by combining ideas from databases, machine learning, artificial intelligence, knowledge-based systems, information retrieval, statistics, pattern recognition, and visualization. KDD has been defined as, “the nontrivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data” (Fayyad, Piatetsky-Shapiro, & Smyth, 1996). The goal is to discover and present knowledge in a form that is easily comprehensible to users (Fayyad et al., 1996). An additional important aspect is the timely delivery of this knowledge to those who will ultimately use it (Kum, Duncan, Flair, & Wang 2003). Such timely information flow is critical in improving government services.

A key characteristic particular to KDD is that it uses operational data. Specifically in child welfare, operational data is administrative data collected by agencies for management and administration purposes. There are different objectives for utilizing KDD, such as exploratory data analysis, descriptive modeling, predictive modeling, discovering patterns and rules, and retrieval of similar patterns when given a pattern of interest (Hand, Mannila, & Smyth, 2001). Many private businesses have successfully applied KDD to operational data for better management, marketing, and planning. For example, Amazon recommends books based on previous choices using KDD technology (Kum et al., 2003).

### 2.2. Self-evaluation

In recent years, entities that fund social services programs, both public and private, have increasingly demanded improved outcomes for clients in return for continued financial support. Thus, social services agencies are required to justify expenditures in terms of program results. This situation has created the need for timely,

reliable, and valid data related to client outcomes. Furthermore, a method of evaluation is also required that is more suited to a governmental system that increasingly emphasizes local control and autonomy, a context not well suited to the experimental paradigm that has prevailed in traditional evaluation research (Usher, 1999).

Detachment of the evaluator from policymakers and program managers is a hallmark of the traditional evaluation approach. Indeed, in their overriding concern about possible contamination from measurement on the treatment or program itself, Usher (1995) stated that “many [evaluators] have taken on the mantle of scientific objectivity in a way that causes them to define their tasks in such narrow terms that their contribution to inform policy debate is minimized.” Under this approach, evaluation becomes adversarial (between evaluators, policymakers, and program staff), can become ill-informed due to the lack of communication between evaluators and staff, and ultimately may be of little benefit (Usher, 1995).

Usher (1995) argued that the self-evaluation approach, as long as it is technically strong, offers a viable alternative to traditional evaluation. Self-evaluation is a form of empowerment evaluation that is collaborative and participatory. Self-evaluation is usually carried out by a team of diverse people, the SET (self-evaluation team), gathered locally for their expertise. In this approach, evaluators may work for an independent organization or be employed by the agency administering the program. The evaluators work alongside policymakers, program managers, and staff to establish outcomes, monitor performance, and provide continuous feedback for program planning and management. The SET defines a concrete set of outcomes as target goals for the local agency. The focus of self-evaluation is to change policies and practices to make progress in the direction set forth in these performance targets in each outcome area. In other words, as changes in programs and practices are made, these outcome measures are monitored to see whether there are associated changes in outcomes. The programs and practices are adjusted or redefined as needed on an ongoing basis. Thus, it is more a process rather than an end product. New goals are added as previous goals are met (Usher, Wildfire, & Schneider, 2001). North Carolina’s county administered system of social services is the kind of context in which self-evaluation may well flourish.

In most sites, the outcome-related data is supplemented by process-oriented data describing program operations. The process-oriented data will confirm changes that occurred in programs and practices. Then the outcome measures can be monitored to see whether such changes in programs and practices have associated changes in outcomes. Accordingly, the programs and practices can be adjusted and refined as needed. In other words, self-evaluation involves both sides of the evaluation equation – interventions and outcomes (Usher, 1999).

## 3. Child welfare (CW)

The primary responsibility of child welfare agencies is to ensure the safety and protection of children from abuse and neglect. On a daily basis, that entails the investigation of reports of abuse and neglect, assistance to families and children at risk of abuse and neglect, and, finally, the temporary care of those children who can no longer remain safely in the home.

When there is a report of abuse or neglect, the child welfare agency must investigate the allegation in a timely manner. If the report is found to be true, or *substantiated*, steps are taken to ensure the safety of the child at risk. Depending on the severity of the situation, the social worker can work with the family to improve the situation so that there is no longer a threat to the child, or he or she may place the child in foster care if the risk is deemed too great. Typically, child welfare agencies attempt to keep children with their parents or caretakers unless it becomes no longer plausible.

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