



**The Kansas Department of TRANSPORTATION  
BUILDS a Transparent and Nimble  
Cash Flow Forecasting SYSTEM**

**BY MARCIA FERRILL, KYLE MALCOM, AND ROB SUGGS**

One of the most important questions any agency faces is whether current obligations can be met with available resources. The question is easy to ask, but deeply difficult to answer. The Kansas Department of Transportation will apportion \$6 billion over ten years for construction projects to maintain and modernize the state's leading transportation system while trying to account for forces such as declining cash balances, budget cuts, and weather-related expenditures that affect cash flow. As a result, KDOT implemented its Cash Availability and Forecasting Environment application — known as CAFÉ — allowing agency managers to detect and respond to cash flow shifts quickly, easily, and accurately.

### TIME FOR AN UPDATE

Since the 1980s, the agency had produced cash flow forecasts to estimate project payouts and long-term cash needs, and support decision making for program development and project bidding. KDOT wanted to build a forecasting system that would automate and streamline the spreadsheet-based system it had been using. Updating the interrelated spreadsheet model, originally created by an economics expert who worked for the department, was a six-week process — data were collected, manipulated, and formatted into a cash forecast using more than 20 interrelated spreadsheets and manually incorporated project data. The agency was going to have to invest in a new system that would provide backup and reasonable, ongoing support for a critical function.

The need for a new forecasting process became more urgent when unprecedented budget cuts occurred, slashing available funds and reducing cash balances. The agency's cash margin was slim, making cash flow forecasting critical to the agency's financial operations and a key component of construction bidding decisions. KDOT's overall goals in pursuing an alternative forecasting process were to: 1) reduce risk through transparent management of cash forecasting models and assumptions; 2) produce daily forecasts to proactively manage change; 3) run "what if" scenarios for projects; and 4) automatically integrate project data from the

agency's updated project management system. The former spreadsheet-based system could not meet these demands.

### DEVELOPING THE RIGHT TOOL

**Vendor Selection.** KDOT hired an independent consultant to guide the agency through the modernization of both the project management and forecasting systems. KDOT and the consultant formed a committee with staff from KDOT's Office of Financial and Investment Management, and its IT/Database Administration to determine the criteria and select potential vendors.

It became immediately obvious that there was no off-the-shelf solution. The committee then evaluated approximately 30 vendors and reduced that list to nine vendors. The vendor KDOT went with had:

- Sophisticated statistical processes that addressed curvilinear data rather than just linear data. ("Linear" refers to an underlying assumption that a straight line can reasonably explain the association between two data points.)
- Complex models to address real-world issues that did not require manual manipulation.
- A user interface that was intuitive for model builders and users.

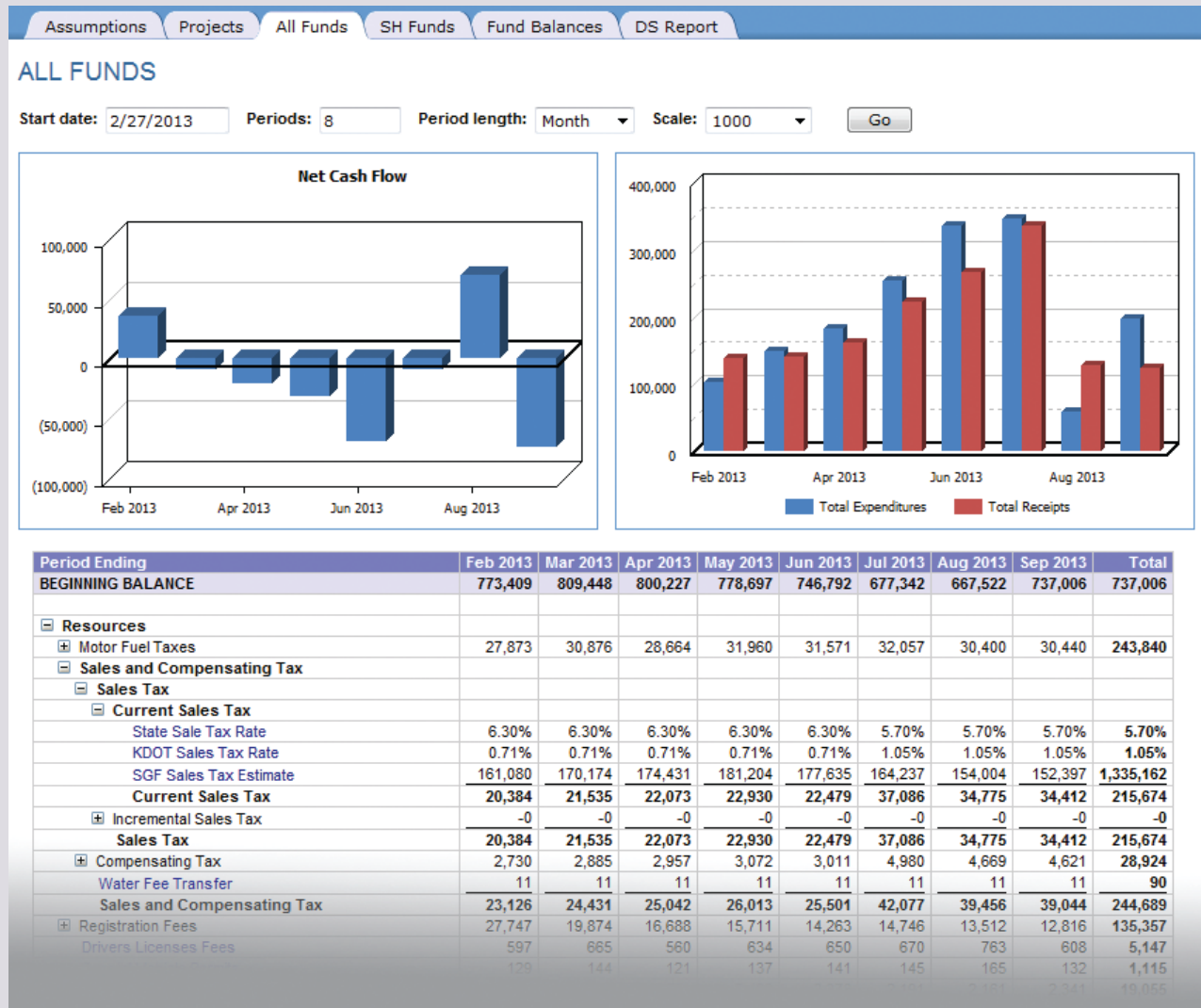
- Excellent analytics.
- A grid computing option that helped speed the development of the model and the initial analysis of historical data (although this wasn't an initial requirement).

**The Development Process.** The vendor worked with KDOT's database administrators to ensure the CAFÉ cash forecasting system could run with the project management system the agency was creating at the same time. The firm also worked closely with finance staff to design the user interface and reports.

Because users access CAFÉ through a web browser, it was easy for KDOT staff to approach development iteratively — the vendor tweaked the system, the agency provided feedback, the vendor uploaded a new version, and so on. This

Updating the interrelated spreadsheet model, originally created by an economics expert who worked for the department, was a six-week process.

## Exhibit I: CAFÉ Screenshot



process was ideal for the creative back and forth inherent in developing a new system and ultimately helped the agency meet its original goals as well as addressing needs discovered during the process.

**Creating the Payout Curve Model.** Payout curves associated with project data are used to predict future cash payouts. The sum of these curves provides the overall cash needs of the agency. KDOT originally had 13 payout curves, in the form of tables for many project types. What the agency needed was a dynamic

The payout model now used in CAFÉ was developed by analyzing every payout scenario across all project types in KDOT's available history.

model that could accommodate fluctuations — if, for example, a project was unexpectedly delayed through the winter (a “low season” for construction). KDOT also wanted a model that could adjust forecasts for any bias — did

construction managers consistently believe that projects would end sooner than they did? Or later? Were assumptions about materials costs normally too high or too low? These biases, however, are not fixed. Staff changes, and people often improve their estimates over time. To have accurate forecasts, the model not

only needed to adjust for bias, but bias that changed.

The payout model now used in CAFÉ was developed by analyzing every payout scenario across all project types in KDOT's available history. Because decades of projects meant an enormous amount of data, the vendor analyzed KDOT's data using grid computing — a series of computers that are linked to improve processing power. The resulting model simulates what is most likely to happen to a project's payout, based on history and system manager inputs. CAFÉ automatically applies the payout model to every project. System managers can adjust a number of parameters including project start times, end times, cost estimates, or test scenarios such as storms or funding shortfalls, to see how payouts will change. They can also track any changes in the amount of bias — overestimates or underestimates by staff — and update the payout model accordingly.

**Addressing Cultural Change via Training.** Before implementing both CAFÉ and the new project management system, the agency provided project data used for cash flow forecasting via CDs once a month, and only after projects were bid. The spreadsheet system used placeholders to estimate future bidding values, which were input manually. The manual processes involved inevitably led to data sharing and reliability problems. Now, CAFÉ automatically integrates project data, and changes made to a bidding date or cash projection are automatically updated in the system.

Another advantage of CAFÉ is that it allows project managers to understand their impact on the agency's cash balance. A train-the-trainer model has given managers throughout the organization a common understanding of cash flow management — namely, that every project affects cash flow. Now, when design or construction managers ask if we can move the bidding of a project (whether it's \$3 million or \$30 million), project managers and decision makers ask if the agency can afford it, and when. CAFÉ answers these questions instantly.

**The Transition Process.** KDOT produced forecasts using both CAFÉ and the previous spreadsheets simultaneously for

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a year to allow for continued updates to the project management system, and to compare results.

## CONCLUSIONS

CAFÉ has proven to be an effective tool for the agency to efficiently manage cash and predict future cash availability. As an agency, KDOT is now able to manage cash balances with a system

that supports and improves overall program management, project bidding, and cash management decisions. CAFÉ has also helped the agency plan and support the state's 10-year, \$8 billion program for highway maintenance and preservation.



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### What the cash flow forecasting system can do:

- Changes made to projects flow from the project management system and through all forecasts instantly.
- Create daily, monthly, or annual forecasts, depending on the horizon.
- Instantly forecast cash payout over the life of a project.
- Print out the agency's list of assumptions to share with leadership for maximum transparency.
- Create a payout curve model that automatically adjusts for bias, seasonality, and project length, among other factors.
- Test "what-if" scenarios to build contingency plans and respond to legislative inquiries.
- Time bond issuance for the best return.
- Time when projects should be awarded.

As the agency looks forward and continues its progress on this program, CAFÉ will support the department to assure that obligations can be met. ■

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