TO: Joint Technology Committee
FROM: Jean Billingsley, Senior Research Analyst, 303-866-2357
Joint Technology Committee (JTC) Staff
SUBJECT: JTC Staff Analysis of JBC-Referred Request for Input
Colorado Department of Revenue (DOR)
GenTax Data Warehouse and External Severance Tax Administration

March 7, 2019

Reason for Referral

This memorandum responds to the December 11, 2018, letter from the Joint Budget Committee (JBC) requesting that the JTC study the feasibility of:

- an IT capital construction project to purchase or develop a state-owned tax data warehouse; and
- the development of a severance tax administration module, independent of the GenTax system.

The letter suggested that funding for the implementation of a tax data warehouse be considered in conjunction with a Colorado Department of Revenue (DOR) FY 2019-20 operating budget request. The DOR operating request adds GenTax full-time employees to maintain and support the GenTax system and state tax administration. The committee considered the operating request at its March 7, 2019, meeting.

Bill Recommendation

Staff recommends the committee sponsor a bill to:

- provide funding for an independent consulting firm to assess the GenTax system; and
- create a task force to evaluate ways to improve state tax reporting, study the possibility of implementing an external severance tax module, and manage the independent consulting firm.

Independent assessment. Staff recommends that the department retain an independent third-party consulting firm managed by a newly created task force. The consulting firm would provide an assessment of the existing GenTax system and identify areas of improvement, including evaluating options to: (1) provide a robust tax reporting and analytics solution; and (2) develop and maintain an
external severance tax module that interfaces with the GenTax system. This assessment may also include options for managing the recurring changes in tax data, and as a result, generating new tax reports to track those tax changes.

**State tax system task force.** JTC staff recommends the committee create a task force to conduct a detailed analysis of the existing GenTax system. The task force would assess tax reporting options and ascertain if developing and supporting an external, independent severance tax module is a viable addition to the state’s tax system. The task force would evaluate tax reporting options before investing more time and money in correcting the GenTax technical debt.¹

The task force, using existing resources, would be a collaborative effort between the Colorado Department of Personnel and Administration, DOR, the Governor's Office of Information Technology (OIT), and the legislative branch. JTC staff recommends that legislative representatives be involved because tax reports are critical tools used by the General Assembly when forecasting the state’s budget, and limitations in timely access to tax data may contribute to uncertainty and estimation errors in fiscal notes and revenue forecasts. Staff recommends that JTC staff provide project management services for the task force. The JTC staff project manager would: (1) ensure that approved goals and objectives are accomplished; (2) work closely with DOR and OIT to ensure compliance with state standards; and (3) provide status updates to JTC members, and DOR's new GenTax governance organization.

**GenTax Reporting Improvements**

The JBC asked the JTC to review the possibility of creating or purchasing a state-owned tax data warehouse to improve access to state tax reports. Currently, the GenTax system and some state tax forms provide limited tax data. Similarly, the Legislative Council staff economists, fiscal note analysts, and JBC staff have encountered issues when requesting tax data, as described in Appendix A. DOR's FY 2019-20 operating budget request does not address nonstatutory reporting.

Timely, relevant tax data is essential because it supports:

- identifying problematic tax areas and taxpayer errors;
- estimating revenue impacts for fiscal notes and producing revenue forecasts;
- evaluating tax expenditures, including tracking enacted tax expenditures to confirm policy objectives;
- determining credit ratings for municipalities, counties, and special districts; and
- assessing the health of the state and regional economies for economists, bankers, and the business community.

¹ Software system technical debt is defined as any requirement that a system does not provide, and can range from trivial to critical. Any stakeholder dissatisfaction with an application can be considered as part of that system’s debt. All software systems carry some technical debt, and the level of technical debt that a system has sometimes gets worse over time as the system and the requirements grow. The challenge is to manage the technical debt so that critical or work stoppage issues are handled and communicated to stakeholders appropriately. Options to reduce technical debt may include a more cost-effective approach that requires replacing the application rather than continuing to invest in the existing system.
Colorado State Tax Expenditure Review. In September 2018, the Colorado Office of the State Auditor (OSA) published its review of the state's tax expenditures pursuant to Senate Bill 16-203 (review). In the review, OSA states that even though DOR supported its investigation, some of the tax expenditure information that OSA requested could not be provided. The review lists some of the challenges in obtaining relevant state information from the GenTax system, such as: (1) DOR's lack of available technical resources to develop new database queries that produce tax reports; (2) some relevant tax data on the tax forms are not collected and stored in the GenTax database; and (3) some relevant tax data are not stored in the GenTax database in a way that makes that data accessible. For example, multiple tax expenditure data are aggregated by taxpayers prior to reporting and then combined on a single line on the tax form. DOR says that the tax form design simplifies the reporting process. Requiring taxpayers to provide more information may increase filing costs and become a burden for taxpayers. The advantages and disadvantages of capturing all the available tax data in a reportable format should be evaluated by the task force (see Appendix B: GenTax Potential Areas of Improvement).

Tax data warehouse technical summary. Moving forward, the state has a few options to improve access to additional tax reports (see Appendix B: Reporting Options). Besides cost and risk, any changes to improve the GenTax system reporting functionality would need to comply with established state technical architecture, data governance, and IT security policies, rules, and standards that govern the data that are collected, and how data are processed, stored, and accessed. Some reporting options offer many features, such as a web portal and tools to analyze the data. Other options with fewer features than a data warehouse solution could be implemented at a lower cost. As shown in Figure 1, a basic reporting architecture design might include a:

- transactional database, such as the existing GenTax database;
- a data mapping/conversion tool or database code (e.g., T-SQL, PL SQL);
- a database used for reporting and data analysis (e.g., data warehouse, data mart); and
- a reporting tool (e.g., statistical analysis system).

Figure 1: Basic Reporting Architecture

[Diagram of basic reporting architecture showing relationships between GenTax database, data mapping and cleansing, data warehouse or data mart or flat text file, and workstations with potential cloud solution and data reporting tool or data analysis tool or data mining]

Prepared by Legislative Council Staff.

The GenTax system consists of a transactional database for tax administration processing, a data warehouse that is used to generate standard GenTax reports, and reporting tools that provide limited tax reports. GenTax contains many standard database queries for reports; however, nonstandard reports are considered an optional GenTax feature that the vendor can add at a cost. Additionally, it is possible to run ad hoc database queries on the production transactional database to produce non standard reports, but such queries are challenging due to DOR resource constraint issues and the possibility of performance degradation in the GenTax production system.

External Severance Tax Module Considerations

The JBC asked the JTC to consider the development of a severance tax administration module, independent of the GenTax system. The state could seek a commercial off-the-shelf (COTS), vendor-provided solution or develop and maintain custom software. With COTS software, the advantages may outweigh a custom solution, including possibly benefiting from: (1) routine upgrades and industry best practices; (2) less risk than developing a new system; and (3) reduced technology obsolescence since the vendor is motivated to keep its technology up to date. On the other hand, if the functional requirements of the severance tax administration module are unique, then custom software may be the state's only option because available vendor software products may not meet mandatory requirements. Additionally, providing alternatives to support the state's tax requirements may reduce some of the disadvantages DOR is now experiencing with maintaining COTS software, such as vendor dependency.

The GenTax system's design follows an n-tier, or multi-tier, architecture in which the presentation, processing, and data are separated. This design typically provides developers more flexibility when modifying existing code.

Figure 2: GenTax Architecture

Source: Colorado Department of Revenue, response to JTC staff question, February 2019.

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3 “Build vs buy” is the decision to either develop an in-house, custom solution or purchase a solution from a vendor. The decision should include not only a cost-benefit analysis but also the total cost of ownership in order to account for all expenses required to support any new solution. Typically, organizations choose to “build” a custom technical solution when the business needs are too unique, and they pursue the “buy” solution when COTS software can satisfy most or all of the functional requirements.
The GenTax system is based on a core architecture that can be configured to provide various options, settings, and functions. Even though GenTax is COTS software, approximately 92 percent is proprietary vendor code. The remaining 8 percent is custom code. The custom code is a result of functions being added before those functions were in the GenTax proprietary code. Therefore, if Colorado needs severance tax functionality added to the existing tax system, and GenTax does not offer the functionality in its proprietary code, then custom code would need to be added to the existing GenTax system. As a result, the option to develop an external, custom-coded severance tax module may be a viable alternative.

Technically, creating an external severance tax module is possible because GenTax has the capability to interface with an independent, external severance tax module, and it currently interfaces with other systems. GenTax also offers a suite of tools to implement and manage web services, which are used to transfer data or transactions between databases using a web-based interface. This GenTax tool can be used to develop inbound and outbound data streams that move data between GenTax and another authorized system.

GenTax uses object-oriented programming, meaning the code modules do not have “tight” dependencies. Even so, DOR says it has concerns about creating an external, independent severance module that would not have its parent customer record, or any other related records. Nevertheless, an external severance module could link its severance tax records back to master records in the GenTax system. The task force would need to evaluate if the severance tax functional requirements can be met with the GenTax proprietary code; if not, GenTax custom code may be needed.

Developing and maintaining custom software, such as an external severance tax module, does add risk; however, if the functional requirements are unique, then custom software may be the only option because vendor software products that effectively meet mandatory requirements do not exist. Additionally, providing more technical options to support the state's tax requirements may reduce some of the disadvantages DOR is now experiencing with maintaining COTS software. These disadvantages include a vendor dependency. Even so, with COTS software, the advantages may outweigh a custom solution, including possibly benefiting from: (1) routine upgrades and industry best practices provided by the vendor; (2) reduced risk of developing a new system; and (3) reduced technology obsolescence since the vendor is motivated to keep its technology up-to-date.

**GenTax System Summary**

GenTax processes hundreds of tax types and programs, including:

- individual income tax in 26 jurisdictions;
- withholding tax in 28 jurisdictions;
- business taxes in 34 jurisdictions;
- estate/inheritance taxes in 14 jurisdictions;
- tobacco taxes in 28 jurisdictions; and
- alcohol taxes in 20 jurisdictions.
In 2018, 83 percent of the tax returns were electronic. The other 17 percent were paper. The GenTax core functionality focuses on processing tax returns and payments and issuing refunds and bills. The system also includes support functions, such as a web-enabled functionality for taxpayers, refund approvals, collections, and fraud.

The state has a maintenance agreement with the GenTax vendor, Fast Enterprises (FAST). FAST currently provides technical support under the maintenance agreement at an hourly rate. The FAST Colorado support team consists of the 17 FAST employees: 1 project manager, 1 database administrator, 3 lead developers, 11 developers, and 1 system architect.

Approximately 25 states, including Colorado, currently use GenTax. According to the Federation of Tax Administrators, the market may have about two other vendors that provide tax software. Florida and New York, states that are comparable to Colorado’s tax complexity, have custom systems. California’s four tax agencies use a combination of custom and COTS systems.
Appendix A

GenTax Potential Areas of Improvement

- Lines from supplemental tax forms, such as those used to calculate and claim tax credits, are generally not mapped in GenTax unless directly related to a taxpayer's income tax liability.

- Many tax expenditures and tax modifications (such as income tax additions and subtractions/deductions) are grouped on a single line of the tax form.

- Tax credit carry-forwards are grouped on a single line of the tax form, which limits the ability to determine how much of a given credit is being carried forward by a taxpayer.

- Data available at the federal level are not available for some significant drivers of Colorado revenue (e.g., income from capital gains).

- Due to a lack of comprehensive data, Colorado has a limited ability to model the impact of federal tax law changes on the state (e.g., modeling the impacts of the federal Tax Cuts and Jobs Act).

- Due to a lack of documentation and the proprietary nature of GenTax core code, DOR staff were not able to verify the validity or reliability of data in some instances.

- To meet statutory reporting requirements, DOR has relied on third-party data (e.g., from federal government data reporting sources) instead of actual taxpayer data when estimating the revenue impact of many tax expenditures.

- Due to issues in the custom code after the GenTax proprietary code was updated, data became unreliable, or it could not be compared across years for many tax expenditures. DOR staff have instructed Legislative Council Staff not to treat values from the same data series in 2013 and prior years as equivalent to those in 2015 and later years due to inconsistencies in the way that the data are extracted in GenTax.

- For more than a decade, DOR produced monthly retail sales reports. After the GenTax system was updated, these reports were no longer available, and have been postponed until further notice. These reports are a key resource of information for analyzing sub-state regional economies for local governments and the business community.

- 2014 Statistics of Income data were lost and cannot be recovered due to a break between the custom code and proprietary code.

Source: Joint Technology Staff interviews with legislative staff.
Appendix B

Reporting Options

1. Contract with FAST to expand its existing reporting capabilities. GenTax currently has a data warehouse that is used for its standard reporting. FAST also offers three reporting options:
   a. The reporting subsystem is used for external, formal tax reports. DOR says that tax laws change so frequently that DOR and FAST do not have the resources to make this a viable option.
   b. The data mart subsystem provides a view of the tax data using a pivot table that gives authorized users the ability to group, filter, sort, and summarize the data. DOR explains that this solution requires more technical resources to utilize.
   c. The query subsystem gives authorized users the ability to execute ad hoc queries. The DOR Office of Research and Analysis already uses the query subsystem for all legislative, internal, and external report requests.

2. Export a batch text file after hours that is used with a data analytics tool. GenTax interfaces with approximately six systems using a secured file transfer protocol (FTP). If OIT approves (e.g., IT security), authorized users could access the data in text files located in an FTP folder using a data analytics tool, such as Statistical Analysis System (SAS).

3. Implement a cloud solution, either as a native cloud option or a cloud deployment option. Cloud solutions are appealing because of the potential benefits in cost, scalability, and agility. Even though SAS is one of the leaders in providing data science products, other tools and cloud solutions are also options. Additionally, similar to COTS software, cloud solutions might appear to be the best option, but only if the functional requirements are not too unique.

4. Develop and maintain an external state tax data warehouse or data mart. This option will require software and hardware costs, along with technical resources to develop and maintain.

5. Create a replication or mirror copy of the production transaction database. A replication database would provide more options for technical resources to develop database queries. Any complex, processing database query could then be executed in the replication database instead of the production database.

Source: Joint Technology Staff interviews with legislative staff.

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4 Even though the replication database does not correct DOR’s technical resource constraint issue, it does improve GenTax disaster recovery since a database replication may serve as fail-over during server failure. DOR explains that in January 2018, OIT turned off an existing GenTax database replication process due to insufficient bandwidth on the state network. Using a replication database for reporting purposes may require the purchase of another database license.