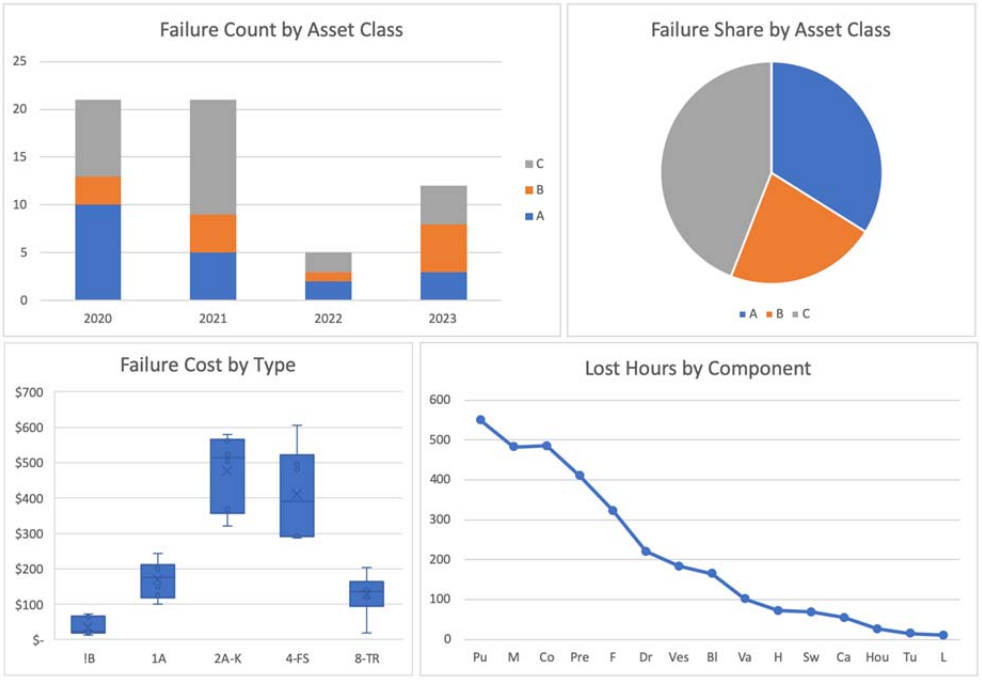
Computerized Maintenance Management System (CMMS) Replacement



Project Purpose:

The purpose of this project is to obtain two new software systems in parallel: (a) a new computerized maintenance management system enabling a reliability-centered maintenance approach to district assets; and (b) a new financial system enabling more efficient financial and budget processes and improved reporting and analysis. In addition, both systems will support the district's asset management program and capital improvements planning. The systems will be fully integrated with one another and with relevant other district systems.

Although the purpose of the project is improved performance, the new systems are also required in order to replace the Oracle WAM system, as discussed below.

Project Champions:

- William D. Walker, Director of Planning and Strategy (computerized maintenance management system, system integration, and project business case).
- Jeff Brochtrup, Assistant Chief Engineer and Director of Finance (financial system).

Departments: Planning and Strategy, Finance, Operations and Maintenance

Others Affected: All workgroups to the extent they use the functions of the systems.

Project History and Status:

The district installed the Synergen system in 1997 for an initial implementation cost of approximately $1.0 million (or $1.6 million in 2019 dollars). The system was a computerized maintenance management system (CMMS). It also provided financial functions, which was unusual at the time. The company that developed the system was subsequently bought by Oracle and the system was renamed "WAM". Oracle has developed WAM into an enterprise-scale system aimed at the high end of the market. The district still relies on the WAM system.

In 2014 the district learned that the current Oracle WAM version — v. 1.9 — would no longer be developed nor fully supported by Oracle. Instead, Oracle is developing version 2.0 and expects customers to switch to that version after 2021. Oracle will provide legacy support for version 1.9 at an undetermined but higher cost, and for an indeterminate period.

Initially, the district assumed that the transition to version 2.0 would be an involved but otherwise normal software upgrade and approached it accordingly. The district contracted with Ernst & Young for a formal assessment of the capabilities of version 2.0 to verify its suitability and to identify functions that would require attention during the upgrade.

In parallel with the assessment, district staff did additional research on version 2.0's overall suitability for the district. This research included consultation with similar agencies. The assessment and staff research together revealed that, despite the small change in version number, WAM 2.0 is a different product than version 1.9 and is not the appropriate tool for the district.

As noted in the Ernst & Young report:

> *"WAM v2 was built to support very large tier 1 utility implementations. These are utilities with millions of customers, multiple business lines, departments and locations. As a result, it was built to be extendable and flexible to accommodate all business lines and locations. However, with flexibility comes complexity and additional cost to implement, maintain, and patch, i.e., more FTE's to support it. For an organization the size of the district, and the scope of which WAM is used, it is expected to take 2.5 FTEs to support the WAM 2.x application."*

In addition, Oracle WAM is built on a non-Microsoft software platform. Since the district's other IT systems are primarily built for the Microsoft environment, supporting Oracle WAM v. 2.0 would require expertise not currently available in the district.

Reflecting this, staff changed the scope of the project from a normal software upgrade to a search for a new computerized maintenance management system and a financial software system. Through internal discussions, staff established a tentative process pathway, which was presented to the commission in fall of 2018.

During that time, important information was provided through work on the district's draft plant asset management plan. The draft plan identified a need for significant changes in the district's maintenance management system; specifically, how that system is configured and used to support maintenance activities. It became clear that merely replicating the functionality of WAM in a new system would not serve the maintenance and asset management program needs of the district.

(Briefly, the ability of the asset management program to deliver needed levels of service at lowest lifetime cost and at acceptable risk depends on maintenance practices. In particular, minimizing cost and risk for a growing and aging plant such as the district's requires more sophisticated analysis, maintenance work scheduling, work planning, and asset data. These in turn require a new CMMS and associated business processes.)

In light of this information, the district proposed, and the commission approved, a new position to have primary responsibility for implementing a new CMMS. The position is located in the department of planning and strategy, together with the asset management program and the IT group. The position will ensure that the system is used to its fullest capacity to maintain assets, meet expected service levels, limit risks, and control costs.

Currently, the district is recruiting for the new position and finalizing details of the governance structure for this CMMS and financial systems project. Primary responsibility for the project rests with the director of planning and strategy, with a steering committee composed of him plus the chief engineer and director, director of wastewater operations and reliability, and director of finance.

The new CMMS position will be the project manager for the CMMS implementation. The project manager for the finance system is still to be determined, but is likely to be provided through a contractor, supported by an expert staff person in the IT workgroup. Resource constraints in the finance department make a finance-specific project management option impractical.

Project Options:

For the project as a whole, options centered on three issues:

1. The method of selecting system vendors;
2. The number of systems implemented; and

3. The sophistication of the systems chosen.

First, in selecting a new system, the district plans to begin by using the services of independent selection consultants, one on the CMMS side and one on the financial systems side (it is possible a single consultant could cover both areas). Selection consultants would help the district identify its business and technical requirements, and then identify systems that best align. This is the recommended option.

Alternatively, the district could skip this step, choose a consultant affiliated with a particular system vendor, and move directly into system implementation. This approach was used for the district's project to deploy Esri as its GIS platform. However, in GIS, the number of vendors is small, it was clear from previous research that Esri is a fully suitable product, and it is the system already used by key district customers.

By contrast, based on market research to date, staff believe that there are too many CMMS and financial systems options — each having very different qualities — to select vendors at this point. Furthermore, a selection consultant will provide help in thoroughly and formally documenting what the district needs in a new system. (This step had already been completed for GIS.)

Second, the district expects to implement two separate systems, a CMMS and a financial system. Separate systems have the advantage of being more targeted to their purpose and of a smaller size and reduced complexity that are more suitable to the district's staffing level, as indicated in the Ernst & Young quotation above. It should be noted that separate systems would still be fully integrated both at a technical level and a business process level. This is the recommended option.

The alternative is to implement an "enterprise" scale system that provides both functions. (Oracle WAM is an enterprise system.) Unlike when WAM — then Synergen — was first installed, in the current market, enterprise systems are designed for significantly larger organizations than the district; generally, businesses with very large physical plants in multiple states or countries. Furthermore, enterprise systems have billing, upgrade, and technical support processes aligned to large-scale business needs, not to operations the size of the district.

The third dimension is sophistication of the systems chosen. No recommendation can be made until a review of district needs and the options is completed. However, in very broad strokes, the district expects to land in the middle of the market, with systems that are mature and fully supported, but that are not overly complex for district needs. A key issue in this area is choice between a software-as-a-service model and a locally implemented model.

There is a fourth issue to consider: delaying the work for several years and continuing to use WAM version 1.9. This option has not been given serious consideration, because of the obvious risk of having a maintenance management system that is no longer supported by its vendor.

Furthermore, the current WAM system is not properly configured to support reliability-centered maintenance. (The Ernst & Young assessment of WAM version 2 and the draft plant asset management plan provide details.) This means that delay in implementing a new system will delay implementation of the district's asset management program.

It is somewhat more plausible to delay the finance side of the work. As noted, there are resource constrains in the finance department that could make immediate implementation of a new finance system challenging.

However, the district plans to proceed with both sides unless it becomes clear that the finance side needs to be delayed. Waiting to start work would risk system failures given the long-lead times required to identify and implement new systems. In other words, continuing to use WAM should be regarded as a temporary fallback option, allowing this project to be slowed down if critical problems arise in staffing, consultant selection, etc.

Software Project Uncertainty:

In reviewing the project, it is important to recognize that this is a software system transition project. Unlike the district's more familiar construction and rehabilitation projects, software projects are inherently unpredictable. This has been demonstrated already in this project, which began as a normal upgrade, turned into a WAM replacement search, then turned into a project to implement a shift to reliability-centered maintenance (in addition to a new finance system), with an additional position to support the CMMS effort.

Although staff do not anticipate an increase in the overall size of the project, it is likely that significant changes will occur in the precise goals of the project and in the timeline. Changes are most likely in the next two years, as the district thoroughly evaluates its current and desired business processes; system requirements; and the markets for maintenance management systems and financial systems. In particular, the district will choose between a software-as-a-service model and a locally implemented model. Each will require a different approach to design, integration with existing systems, and training.

It is also possible that changes will occur in the governance structure for the project, if it is learned that the financial system side can proceed faster than the CMMS side or must proceed more slowly or separately.

The cost and schedule estimates below are deliberately conservative to reflect this uncertainty. The high end of cost and time estimates was chosen. An expensive and slow project is undesirable for many reasons. However, for capital planning purposes, over-estimating is desirable for uncertain software projects.

Project Schedule:

For work of this complexity, an ideal schedule would require three years, with identification of requirements and selection of vendors in the first year, and implementation of the systems in the second and third years. A longer timeline carries important risks, including wavering of attention by key staff. However, a rapid pace also carries risk, primarily of failing to adequately identify needs at the beginning, resulting in a system that was not worth the cost.

The schedule and cost estimates below assume a four-year timeline with three phases: requirements gathering, vendor selection, and implementation.

- 2019 March–May
  - Finalize project governance structure.
  - Hire CMMS Administrator position and train the person in district systems.
  - Determine responsibility for management of the finance side of the project.
- 2019 June–December
  - Determine approach to requirements gathering and selection phases.
  - Prepare requests for proposals for those phases
  - Transition management of the CMMS side of the project to the CMMS Administrator, working with a core team.
  - Transition management of the finance side of the project to the project manager to be identified.
- 2020–2021
  - Complete identification of district needs and requirements
  - Select system vendors.
- 2022–2023
  - Implement the new systems.

Major milestones are summarized in the following table:

	START DATE	COMPLETION DATE
Internal Planning	2014	2019
Requirements Gathering	2020	2020
Vendor Selection	2021	2021
Systems Implementations	2021	2023

Budget Estimates:

Total Project Capital Expenditures:

Total project capital fund expenditures are estimated at $3.9 million for a four-year timeline. There is considerable uncertainty in this estimate. More precision will be possible once the two sides of the project are fully scoped and requests for proposals are prepared by the projects' respective project managers.

This estimate is based on an analysis by Ernst & Young as part of the WAM v. 2.0 evaluation and the best professional judgement of district staff. Ernst and Young estimated several options, including WAM v. 2.0 itself and a general cloud computer enterprise asset management system. (The aggregate Ernst and Young cost estimates are not relevant to this new project, however, their estimate included considerable detail on timeline, staffing needs, and implementation costs.)

The cost estimate assumes the following for contract expenses, erring on the high side in all cases:

- Requirements phase consulting: $240,000.
- Selection phase consulting cost: $140,000.
- Implementation phase consulting costs $1,172,500.
- Contract project manager for the finance side plus additional specialized consulting: $245,000 per year.

The uncertainty in this estimate is illustrated by the effects of three variables: (a) total project duration; (b) complexity of requirements gathering and data cleanup; and (c) need for a finance side project manager and additional consulting support.

If the project still completes in four years, but requirements gathering and data cleanup are simpler than assumed, and no finance project manager or additional consulting help is needed, the estimation method above yields a total consultant cost estimate of $1.55 million. If instead the project takes an additional half year, the method estimates total consultant cost of $2.95 million.

For comparison, Ernst & Young's estimates range from $800,000 for an unrealistically fast one-year transition to a cloud-based environment; to approximately $2.9 million for transition to WAM v. 2.0. As indicated above, the cost from the original purchase of Synergen was $1.6 million in today's dollars. It is important to note that Synergen was installed fresh and did not require any migration from a prior system. Data migration will require additional effort for this project.

Operating Fund Impacts:

Most district staff costs for this project are supported by the capital fund and are included in the total project cost estimate below.[1]

In addition, the 2019 operating budget authorized $100,000 for consultant support for this project. To err on the side of caution, the cost estimates above assume all contract costs would be covered by the capital fund in 2020 and later.

Finally, the ongoing cost of the new CMMS and financial system will be covered from the operating fund on an ongoing basis. It is not possible to estimate these costs precisely at this time. However, the Ernst & Young assessment estimated annual licensing costs between $70,900 and $276,000.

Options for Delay and Operating Fund Support:

The recommended option would fully fund hiring of two selection consultants starting in 2020, one for the CMMS side and one for the financial side. The commission may wish to delay project funding until 2021. However, doing so would not reduce costs overall, but would simply defer spending to a later budget year.

Finally, although the recommended option would support this project from the capital fund, the commission may wish to instead authorize spending from the operating fund. As with any capital project for which federal grant funds are unavailable, the cost of this project will ultimately be borne by the operating fund through a transfer to the capital fund. However, supporting the project from the capital fund allows greater flexibility in annual spending, through use of capital fund reserves. (This project is not eligible for a Clean Water Fund loan.)

Staffing:

Project Staffing:

It is impossible to forecast staff needs precisely for this project at this time. However, the Ernst & Young analysis provides information useful for a rough estimate. Primary staff needs are in the department of planning and strategy, as follows:

[1] The sustainable infrastructure manager is currently partly funded by the capital fund, independent of this project. Funding for that position is being transitioned to the operating fund as the plant asset management planning effort winds down. These costs are charged against the asset management project in the capital budget, not against this project.

- The CMMS position will devote nearly full time to this project.
- IT staff will devote an average of at least 1.25 FTE, with larger burden during the build and deployment of the system.
- The Sustainable Infrastructure Manager and Asset Management Specialist will together devote between 0.25 and 0.5 FTE for most of the project.

In addition, staff from maintenance, accounting, and procurement will together provide at least 0.75 FTE during the project. Finally, all district staff will be involved in training during the final rollout of the system.

Total district staffing for the project is estimated to be roughly between 2.0 FTE and 4.5 FTE depending on the stage of the project. The cost estimates below assume an average staff cost of $100,000 per year.

Ongoing Staffing:

The district does not anticipate requiring additional permanent staff at this time. (However, the caution about software project uncertainty should be borne in mind.)

The Ernst & Young assessment of WAM version 2.0 noted that the district currently has too few staff supporting WAM. The reported indicated that:

> *"For a primary software system, like an enterprise asset management or enterprise resource planning for a utility the size of the district, we typically see 1-2 FTEs required to support the system. The district uses WAM for asset management, work management, inventory and all procurement functions. Based on interviews with district staff, they only have .5 FTEs to support WAM. Throughout the workshops we heard from both technical and functional personnel, all of which were consistent in indicating they would like to do more in WAM. While current IT support is adequate to support ongoing operations, they have not had the resources to support any new improvements."*

This situation has been partially remedied by two new positions: (a) a CMMS administrator; and (b) a database administrator. The CMMS administrator will address the problem of under-utilization of the CMMS that was identified in the Ernst & Young report. The database administrator will increase IT capacity to support the CMMS and financial systems, both directly and by freeing resources in the IT workgroup.

Recommended Option:

Provide $3,932,600 in total project costs and estimate 2020 expenditures at $685,000, from the capital fund. Monies would support the retaining of a contract project manager to oversee the finance side of the project. (The district's CMMS position will

oversee the CMMS side.). Funds would also support up to two selection consultants in 2020–2021, up to two implementation consultants beginning in 2021, and related costs.

Note that the recommended option is an estimate for capital planning purposes. The commission controls spending in the capital budget and at contract approval.

Key Risks and Issues:

The software nature of this project creates a variety of common risks, including the following:

- Failure to fully identify and document business processes and user needs.
- Failure to fully evaluate business processes and user needs and to identify valuable improvements before system implementation.
- Failure to fully consult with maintenance supervisors and staff to ensure alignment with reliability-centered maintenance practices.
- Lack of properly skilled and experienced project managers for the CMMS and finance sides of the project.
- Lack of flexible program management structures, including regular evaluation of project status and direction (software projects require significantly more frequent evaluation than construction projects do).
- Lack of adequate internal staff time for needs identification and testing.
- Rushing the project.

In addition, this project faces several unique risks on the finance side:

- Lack of an identified project manager with necessary time, system software expertise, and project management experience (the CMMS side has a new position dedicated to the project).
- Finance business process that have not been evaluated, documented, or updated in many years (the CMMS side has benefitted from a review as part of the plant asset management project).
- Likelihood of retirement of key staff during the project.

These risks are an additional reason to structure the project in two parts, CMMS and financial systems. Managing them separately insulates the CMMS side from finance side risk and allows greater flexibility for schedule changes.

Financial Summary (2019$):

Total Project Cost

District Staff	$1,400,000
Contractors	$2,532,600

Fiscal Year Allocation:

	2020	2021	2022	2023
District Staff	$200,000	$400,000	$375,000	$435,000
Contractors	$485,000	$385,300	$831,300	$831,300
Total	$685,000	$785,300	$1,206,300	$1,266,300

District Staff Burden:

	2020	2021	2022	2023
All District Staff	2.0 FTE	4.0 FTE	3.75 FTE	4.35 FTE