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LOS ANGELES FIRE DEPARTMENT

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FIRE CHIEF

May 8, 2019

BOARD OF FIRE COMMISSIONERS
FILE NO. 19-059

TO: Board of Fire Commissioners

FROM: Ralph M. Terrazas, Fire Chief

SUBJECT: LAFD COMPUTER AIDED DISPATCH (CAD) STATUS REPORT

FINAL ACTION:	_____ Approved	_____ Approved w/Corrections	_____ Withdrawn
	_____ Denied	_____ Received & Filed	_____ Other

SUMMARY
As requested by the Board of Fire Commissioners on February 19, 2019, the Information Technology Bureau (ITB) is providing this report on the status of Department's Computer Aided Dispatch (CAD) System.

RECOMMENDATION
That the Board receive and file.

FISCAL IMPACT
None.

DISCUSSION
The LAFD has been using a custom CAD system, built and maintained by LAFD staff, for more than 30 years. During this time the Department has made considerable investments in both keeping the technology up-to-date as well as evolving the system's capabilities to meet the Department's ever-changing operational needs. This report provides a brief history of the LAFD CAD, its current state and a vision for the future.

The History of LAFD CAD

Early versions of the LAFD CAD were first developed in the mid-1980's using the FORTRAN computer programming language and DEC PDP11 servers. At the time, the platform was modern, functional and fast. Since then, the Department has been through several evolutions including both long lapses in maintenance and major system upgrades. During the first ten years, through the 1990's, upgrades mostly focused on keeping pace with changes to computer hardware standards and less on adding new operational capabilities. Between 2001 and 2004, several major system upgrades took place including: a complete re-write of the system code from FORTRAN to C++; moving

the database to Oracle and the operating system to Linux; and introducing an 'enterprise service-bus' architecture for high-performance and high-availability, enabling the CAD to operate seamlessly from more than one location at a time (e.g. between MFC and OCD). These changes were designed specifically to modernize the underlying system, greatly reducing the risk of technical obsolescence. This architecture remains in place today.

In addition to the core CAD system, the Department has also built and maintains other critical related systems such as the Fire Station Alerting System (1990's) and the Tiered Dispatch System (2014). These systems are built specifically for use with the LAFD CAD. The LAFD also builds and maintains several other integrations between CAD and to external operational systems such as the Intrado 911 phone system, RadioMobile mobile data computers (MDC), PulsePoint, Stryker ePCR, Zetron Voice Radio Switch, and ReddiNet (hospital status).

Over the years, usually when a significant investment is required, the Department has evaluated and seriously considered replacing the CAD system with commercial-off-the-shelf (COTS) software. The last evaluation occurred in 2016 when the Department hired Gartner, an independent consulting firm, to evaluate the current system performance, fit-to-mission and long-term viability. At that time, after considering other available options, Gartner recommended continued investment in the LAFD custom-CAD as the best course of action for at least another five (5) years.

There are many advantages to the Department maintaining its own custom CAD system, but two in particular standout overarching the others. First, is the fact that the Department has full control over the system development priorities and can evolve the CAD in ways that very specifically meet the exact needs of the LAFD. There are no competing priorities with other departments (customers) that set the product direction, and all changes are done for the benefit of the Department. Second, is that the Department has full control over the pace at which changes are made, depending on operational need and organizational capacity for change. Urgent changes can be made in days, while longer term desires can be prioritized against other Departmental needs.

That said, maintaining a custom CAD is not without its challenges. Besides the typical issues associated with maintaining any major long-term program, such as keeping adequate staffing and funding, sustaining a robust, highly complex software solution requires careful management and planning to manage risk and avoid technical obsolescence. For example: the development team must be adequately cross-trained to reduce the risk of creating a dependency on a single 'expert' technical resource; team members must maintain proficiency in the current technology, while still looking towards the future and building proficiencies in newer technology; and finally, the Department as a whole must practice clear governance and direction setting when making decisions about CAD. While we *can* customize the system at infinitum, it does not always mean that we *should*, so the Department is in a constant state of balancing between an ever-growing backlog of work and good ideas, with the practical reality of both the development team's capacity and the organization's willingness for change.

Current State

Throughout the years the CAD system was maintained by ITA staff assigned to work at Metro Fire Communications (MFC). In July 2016 as part of that year's new budget, those staff were permanently moved to the Fire Department and assigned to the Information Technology Bureau. While the staff and their work location did not change, this move solidified their position and importance in the Department. Becoming part of the LAFD organization helped to improve the overall working relationships between this dedicated team of IT professionals and the Department's key business users and stakeholders. The move also provided the Department with much more flexibility in terms of setting the team's priorities and providing them with the resources needed to be successful.

In 2017-2018, following Gartner's recommendation to continue to invest in the current CAD platform, several projects were completed to update the underlying system infrastructure. These included replacement upgrades of all major servers, operating systems and database software versions, bringing them up to the latest versions. As part of the infrastructure upgrade, major enhancements were also made to "eCAD", the emergency back-up / failover system, and how it functions, improving the performance of eCAD making it easier to use. These efforts to update the infrastructure, some of which was more than 10 years old, improved overall system performance and enhanced the system redundancy and high-availability.

In addition to these more 'behind-the-scenes' updates, several major enhancements to CAD took place during this period, such as the development of a new dispatch / call taker map, the addition of AVL-location based dispatch, the addition of special call handling and a mobile version of the MDC for the cycle-teams at LAX as well as the development of a mCAD, a brand-new iOS application for real-time situational awareness. The CAD development team also created a new, "application programming interface" (API) to greatly enhance our ability to integrate with other external systems in a modern, fast and highly reliable manner. Just recently, work was completed to update the CAD client workstations so that they are compatible with Windows 10.

Finally, during this time, the CAD development team has also made changes to its approach and methods of development. Over the past two years, the development team has learned and implemented an agile "scrum" method of software development which focuses the team on smaller development cycles, in shorter periods of time, in order to work on the right things at the right time, while reducing many of the risks associated with software development. As part of this process, the team has adopted new tools for managing the work and creating transparency with the business and is currently exploring cutting-edge tools for automating testing at every level in the development process, to improve the quality of the code that's developed.

Future State

With respect to CAD, the Department is very well positioned for 2019 and beyond. The ITB, guided by the Fire Chief's strategic plan and Department's priorities, have worked with key stakeholders to develop a three-year, forward-looking product roadmap for

CAD. For the remainder of calendar year 2019, our product development focus will be in three primary areas. First, we will continue to make progress on the expansion of location-based (AVL) algorithms and unit management features. Second, we will begin a new project in early June to re-write the location validation, mapping and address management features of CAD. Our goal is to move away from a 'table-driven' location management system and towards a more modern Geographical Information System (GIS)-based location management system. This will not only improve the call taking experience and dispatcher situational awareness, but will also greatly enhance location accuracy and pave the way for many more location-centric features, such as dynamic tactical areas and location-specific unit assignment algorithms. Finally, starting in the fall, a major effort to re-write the Fire Station Alerting System (FSAS) will begin. This project will modernize the CAD / FSAS interface and greatly improve the speed and availability of station alerting. Once complete, the new FSAS will be well positioned for expansion and the addition of new features that the current system is not capable of. And of course, we will reserve an appropriate amount of development capacity for day-to-day, 24x7 support as well as in anticipation of new, unforeseen and more urgent requests as they arise.

CONCLUSION

In the coming fiscal years, our focus will be primarily on continued enhancement of system resiliency and high-availability. With the major upgrades to Fire Station Alerting, the MDC network, the voice radio system and the 911 phone switch behind us and all systems using Internet-protocol (IP) networking, we will be very well positioned to provide CAD and dispatch-related capabilities from any location, including one or more back-up facilities and/or remote sites, depending on the Departmental needs.

Over the course of the next two to three years, the CAD team and ITB leadership will continue to explore and evaluate the CAD marketplace as well as visit and collaborate with our partners in the region and across the country to identify any new features, technologies or full solutions that might be applicable to the LAFD.

Board report prepared by Scott B. Porter, Chief Information Officer.