

CONFIDENTIAL



The City of Amarillo, Texas

COMPUTER AIDED DISPATCH SYSTEM TRANSITION ANALYSIS

February 12th, 2019

NOT FOR PUBLIC DISSEMINATION



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Overview

Introduction

The City of Amarillo, Texas is undertaking the process of accessing to replace or upgrade its current Intergraph CAD system. Recently, the City hired Sciens Consulting to assist them through this process. This CAD Transition Analysis is the first deliverable in that process, analyzing the various options the City has in order to make this a successful endeavor.

Project Background and Management Goals

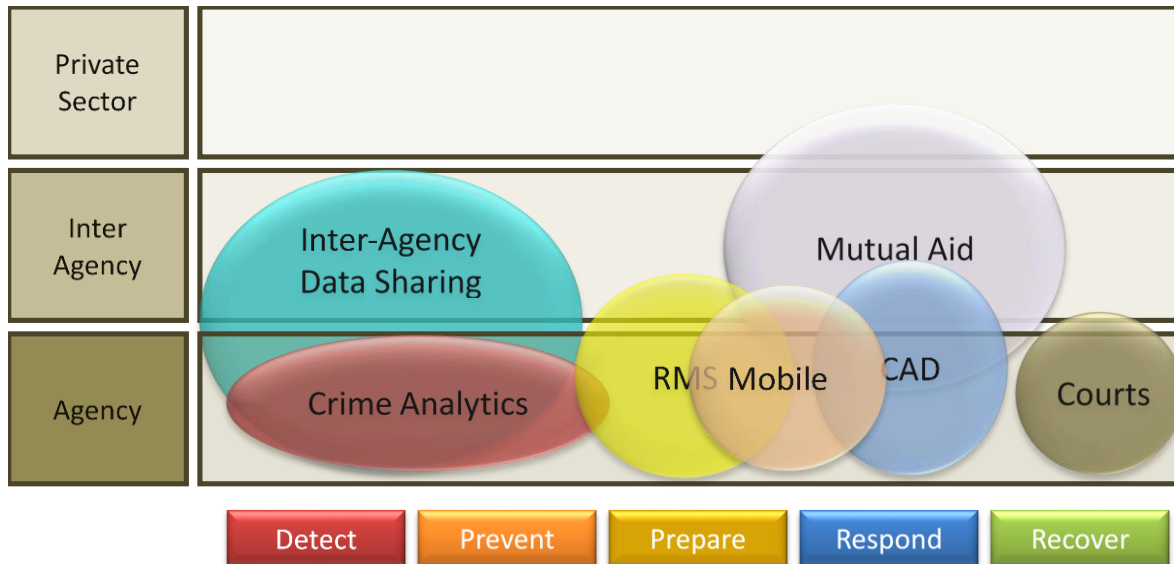
The City of Amarillo currently provides dispatch (CAD) services for the City and maintains a Police Records Management System (RMS) that has reached end-of-life. The current Hexagon Intergraph CAD/RMS system has been utilized by the City for over 15 years. The City is encompassed by Randall and Potter Counties, each with their own Dispatch services. Randall County utilizes the Motorola Premier One CAD system while Potter County utilizes the Motorola Spillman Flex CAD system.

The City engaged the services of Sciens Consulting to assist in the assessment and selection of a new CAD system. Outlined below are the main objectives the command staff expressed would make for a successful project:

- Improve officer, fire-rescue and citizen safety;
- Interoperability, coordination and information sharing among the City and two County Dispatch agencies;
- Integrate with shared Motorola Radio system and phone system across all three agencies;
- Seamlessly integrate with RMS to transfer critical data for more accurate reporting, analytics, and investigations functionality;
- Utilize a flexible system which offers customizable forms and entry fields with smart search capabilities for patrol officers;
- Enhance the ability and effectiveness of staff to perform their jobs;
- Deploy a functional and reliable system with extensive mobile capabilities;
- Facilitate coordinated crime prevention and reduction;
- Built-in upgrades for the first five years to maintain the complex interfaces;
- Provide high levels of data security;
- Provide an open, flexible, reliable technology base for the future;
- Improve data quality;
- Improve data timeliness;
- Increase work process efficiency; and
- Provide cost-effective/economies of scale for the City.

Operational Objectives

The business of public safety is an interconnected flow of activities and providers that when properly orchestrated delivers optimal support to the community. The diagram below depicts the interaction of application systems with the public safety functions.



The integrated public safety system incorporates data sharing and information flow between and among the key operational systems. An integrated workflow is the key that streamlines the call for service first handled by a first responder and that is subsequently used by law and fire management to better prepare for incidents by detecting future trends.

This project is intended to analyze the selection of a new set of systems that will allow the City to capitalize on the benefits of an integrated application workflow by selecting an operational software platform that will allow the City to:

- Reduce the existing systems architecture complexity in order to minimize long-term support costs, enable agency-capable customization through configuration parameters;
- Minimize the multiplicity of systems and databases to improve data management;
- Consolidate duplicative systems and databases to reduce costs;
- Provide tighter workflow integration and improved functionality with the Digital Dispatch capabilities for both Law Enforcement and Fire/EMS;
- Provide tighter integration and improved functionality with the Law Enforcement Records and related Field Based Reporting System;
- Streamline electronic data collection and document review process;
- Improve crime analysis and crime resolution through the use of integrated internal and external databases and modern data mining tools; and
- Provide for rapid recovery of systems from a critical event.

Analysis Description

City command staff interviews, a complete systems architectural analysis, as well as preliminary budgets were developed to define the overall needs of the City's public safety environment. This analysis took into account the needs of Dispatch, Law Enforcement, and Fire, including mobile capabilities.

The results of the functional analysis, were used to determine the current systems' risks as well as their ability to meet the operational and management objectives. Based on data collected and City user interviews, a list of 5 target values and 5 major risks were developed. These values and risks were then assessed for each of the following alternatives and given an overall percentage score to reflect the lowest risk, highest value option. These discussed alternatives include:

#	Alternative Path
1	Maintain the current system – Do Nothing
2	Update Intergraph CAD / transition to Web RMS
3	Replace Intergraph CAD / transition to Web RMS
4	Replace both Intergraph CAD and I/LEADS RMS
5	Interlocal Agreement with Randall County

"Update" in this table refers to upgrading the current version of Intergraph CAD to the most recent version of Intergraph CAD. "Replace" in the table refers to decommissioning the current system and procuring and implementing a completely new system.

In the next step, each alternative was given a score and ranking based on the 5-year cost analysis to deploy and support the overall CAD/RMS system solution. These scores were then weighted and calculated based on the numeric values presented below.

Element	Value
Risks (Lowest Calculated)	40
Values (Highest Calculated)	40
5-Year Total Cost	20
Total	100

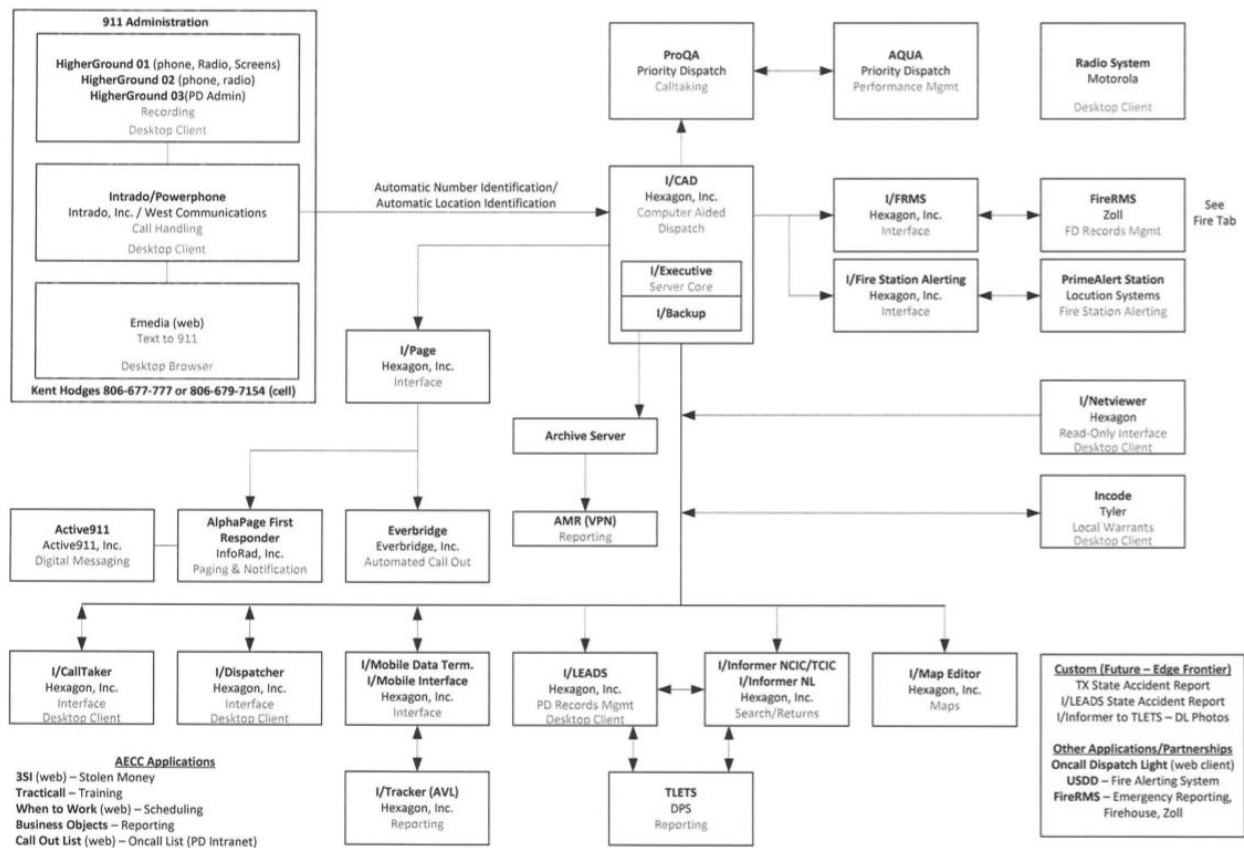
Timelines for each of the alternatives were also developed for reference, but were not calculated in the scoring of this analysis. This report presents the results of this analysis.

Current Environment

Current Public Safety Application Architecture

The organization's current Public Safety system consists of computer-aided dispatch, law enforcement records management, and mobile data computing systems acquired from Hexagon's Intergraph over a decade ago. The system has not ever properly worked the way the organization wanted due to lack of support from the Vendor, lack of upgrades, and lack of key functionality that is standard in today's modern systems. This has prompted the department to begin looking at new options which will enable them to integrate workflows, have robust field reporting capabilities, and provide real-time analytics.

The Intergraph CAD operates in a traditional MS Windows-based client/server environment. Due to the lack of functionality within the system, many interfaces are required to provide the level of service Dispatch needs. These interfaces have been known to break, which makes field operations very difficult and has extensive limitations relative to field reporting and analytics. The current applications interaction diagram is shown below.



The department utilizes a series of applications that are critical to the overall service delivery function. These applications are summarized below.

Table 1 - Ancillary CAD/RMS Applications

*Legend for Current Applications		
Legend Code		Description
R	Replacement	The City is intending on replacing this application with the selected solution.
C	Consider	The City is considering replacing this application with the selected solution, based on the strength of the finalist Vendor offering and cost/benefit of the replacement module.
M	Maintain	The City is intending on retaining the application, not replacing it thru this effort.
I	Interface	The City is intending on keeping the application and interfacing/integrating it with the selected solution.

Current CAD Application/ Interface	Application Notes/ Description	Departmental Owner	Preliminary Migration Plan
ProQA	Priority Dispatch	AECC	I
ZOLL Fire RMS	Fire Records Management System	FIRE	I
WebRMS	Intergraph Police Records Management System	POLICE	I
Locution	Fire Station Alerting	Fire	I
Informer	TCIC/NCIC (Intergraph)	AECC	I/R
IPage	Paging/Text Alerting (Intergraph)	AECC	I/R
AniAli	Automatic Number and Location Identification (Intergraph)	AECC	I/R
AMR Data Transfer	Data Interface between CAD and AMR agency	AECC	I

Most of these applications, although critical to the overall functionality of the organization, are not integrated into a logical workflow. Amarillo's application architecture is characterized by the use of varied systems for most of the Dispatch and Records functions with limited integration amongst them. Most of the processes are complex, multisystem are not integrated with Intergraph which have to be manually inputted each day.

The lack of effective reporting or analytical functionality extremely limits the Department's vision to be transparent and informative to its citizens or officers. This means that with the current

system, the Department is not able to show crime statistics, hot spots or trend analytics to their patrol officers, further putting them at risk. With a new CAD/RMS/Mobile system, officers will have the information they need in a timely manner in order to give the best possible service to the City's citizens.

Current Technical Infrastructure

As part of the Assessment, the following technical areas were examined to identify any challenges that could inhibit the new system's effective installation, deployment, and use. By addressing these during this process, we look to minimize their impact on any new CAD/RMS system deployed.

Technical Overview

The Intergraph system is currently being hosted locally by the City. The City has a primary (City Hall) and secondary datacenter (OPD) which utilize a mix of Cisco and HP architecture. The CommVault platform has automatic recurring backups every week. Overall, IT has done an excellent job in building and supporting an environment that is disaster recoverable and solid in performance. Shown in the table below is a summary of the current technology in the City.

Question	Response
Operating Systems (OS) & Related Software	
▪ Server operating system(s) and version levels	Windows Server 2008 R2
▪ Desktop operating system(s)	Windows 7\Windows 10
▪ Mobile device operating system(s)	Windows 7\Windows 10\
▪ Relational database	SQL
▪ Geographic information system (GIS)	ESRI ARCGIS
▪ Business application environment	MS Office
▪ Document management system	EDOCs???
Hardware	
▪ Server hardware (VM, hypervisor), version level	Dell VX Rail R730 (4 Count), VMWare v6.5
▪ Desktop hardware	Dell Prevision T3500\VDI Wyse 5070 possibly
▪ Mobile devices	Panasonic Toughbook CF-31\Apple iPad\Android\VDI Running on GTAC VRX20
Data Center	
▪ Does the City have space, rack space, and environmental (e.g., AC, power) in its data center to accommodate the new system running (temporarily) concurrently with the old system during install and testing?	Yes
▪ How are backups performed today? If automated, what software does it use?	Unitrends moving to Data Domain. 1 Full Weekly\Daily Incrementals
▪ Does this City have a disaster recovery site or use a hosted, Cloud-based disaster recovery capability?	In process

Question	Response
Network	
▪ Network equipment (e.g., switches, routers)	Dell and Nseries
▪ Does the City have a secondary Internet Point of Presence (POP)? If yes, where is it located (relative to primary), bandwidth and whether load balancing is performed.	2 500Mb POPs, plan on splitting them between our SIMMS building (where AECC is) and City Hall.
Hosting	
▪ Is the City interested in Cloud (hosted) solutions for its system?	Yes
▪ If yes, is Cloud the preferred (or only) option to consider, or is the City interested in evaluating both?	Both
▪ Do you allow City information to be housed outside of your data center?	Not at this time
▪ Do you store information offsite? If yes...	No
▪ Where and for how long?	No
▪ Who has access to offsite data?	No

The current storage platforms are sufficient to support a new system. In order to make the system fully disaster resilient, the CAD will need to be stored on a separate server at the SIMMS location. If the new CAD/RMS system is to be stored locally, the secondary data center will also have to be utilized in order to satisfy these prevention measures.

Functional Review

In January 2019, high-level functional reviews were conducted with the command staff to identify issues with the current business process/system in order to determine the shortcomings that need to be resolved. Below is a summary of these findings:

Fire

- Lack of a good way to hand off calls between 3 PSAPs. (Amarillo, Potter, Randall). Huge disconnect to provide fast service to community. Overfill from Amarillo calls goes to Randall first and then Potter. Would like interconnect with the systems.
- Overfilled calls are written own on paper and then called into AECC which then inputs into the system. Randall only has 2 dispatchers. Potter only has 1 dispatcher at a time.
- Need a way to have built in upgrades for a few years to maintain the various interfaces.
- Need a functional and reliable system with mobile capabilities.
- Mobile: Needs to integrate with Fire and PD. Need CAD to push information to AMR.
- Fire: Would like to the fire preplan data in the CAD system. Need hydrant information to be integrated with the mobile dispatch.

- Hydrant data is updated and loaded into GIS and then CAD 2-3 times per year.
- Routing is not reliable. Would like to tie back when school zones active, reroute around schools. Would also like to integrate with Google Maps and Ways.

Police

- Need a system that directly connects with RMS in order to get better reporting, analytics, and investigation functionality.
- Would like a talk function on the Mobile CAD.
- Better data collection and reporting functionality. A lot of manual searches currently.
- Need a flexible system that is customizable in terms of forms and entry fields.
- Crime Stats: Would like the system to have its own active crime map or be able to interface with Lexus Nexus crime map with automatic updates.
- No useful reporting features in CAD.
- Mobile: Currently doing case reports directly in I/LEADS and transcription, but this process is being phased out by March. Would like speak-to-text functionality in the RMS.
- Need a flexible system which offers customizable forms and entry fields with smart search capabilities for patrol officers.
- Need printing functionality in the cars.
- Systems needs to provide for rapid recovery of systems from a critical event.

Alternatives Value/Risk Analysis

Alternatives Definitions

A meeting was conducted to discuss and further analyze the alternative paths for the City and review the impact of four alternatives as it related to the overall risk and value to the organization.

The alternatives considered included the following:

#	Alternative Path	Description
1	Maintain the current system – Do Nothing	No action will be taken. The current system(s) will remain on the same version level in their current environment.
2	Update Intergraph CAD / transition to Web RMS	Upgrade the current Intergraph CAD with the most recent version of Intergraph CAD 9.4. The current Intergraph I/LEADS RMS will also be upgraded to the Intergraph Web RMS platform.
3	Replace Intergraph CAD / transition to Web RMS	Replace the current Intergraph CAD with a new CAD system. The current Intergraph I/LEADS RMS will be upgraded to the Intergraph Web RMS platform.
4	Replace both Intergraph CAD and I/LEADS RMS	Replace both the current Intergraph CAD and current Intergraph I/LEADS RMS with an entirely new, integrated CAD/RMS system.
5	Interlocal Agreement with Randall County	Work with Randall County to add user licenses to their new Motorola Premier One CAD and RMS System to replace the current Intergraph CAD/RMS. This would most likely require the City to support the entire server infrastructure and application environment, since Randall County will not have the resources to support the system.

Value/Risk Parameters

The Value/Risk Parameters were defined as follows:

#	Value Criteria	Description	Weight
1	Officer Safety	The level of safety of patrol officers in the field utilizing the system. Ergonomics of the screen, ease of system use, and integration of information (e.g., Mugshots photos) were considered.	16.67%
2	Workflow	The level of automation of the workflow as data flows throughout each part of the system. Overall functionality, integration with other core systems, and data transfer were considered.	16.67%
3	Reporting/ Analytics	The level of reporting and analytical functionality with the system. Automated reports, crime analytics, and dashboarding capabilities were considered.	16.67%
4	Vendor Support	The level of Vendor support for the system. Upgrade plans, customer service, and Vendor response times were considered.	16.67%
5	Systems Management	The level of control of the City's IT over the system. Internal needed staffing and data control management were considered.	16.67%
6	Interoperability	The level of interoperability of the system with Randall and Potter Counties. Data integration and recoverability were considered.	16.67%
			100%

#	Risk Criteria	Description	Weight
1	Disaster Recoverability Risk	The risk of being able to rapidly recover from a catastrophic event and provide continued Dispatch services to the community and support to Patrol.	16.67%
2	Functional Risk	The risk of the limitations in functionality of the system increasing response time, data reentry, and overall staffing support.	16.67%
3	Integration Risk	The risk of inability to integrate with other core systems and the reliability of the system to continuously link these connections.	16.67%
4	Vendor Risk	The risk of the Vendor's age, growth, and funding to consistently support the system through updates and patches.	16.67%
5	Product Architecture Risk	The risk of the system's architecture (i.e., Cloud vs local, database structure, Linux vs Windows) to provide a solid, reliable technical environment that the IT staff are able to successfully support.	16.67%
6	Governance Risk	The risk of the unanimous agreement and continuous needed management of the entire system between the City and County.	16.67%
			100%

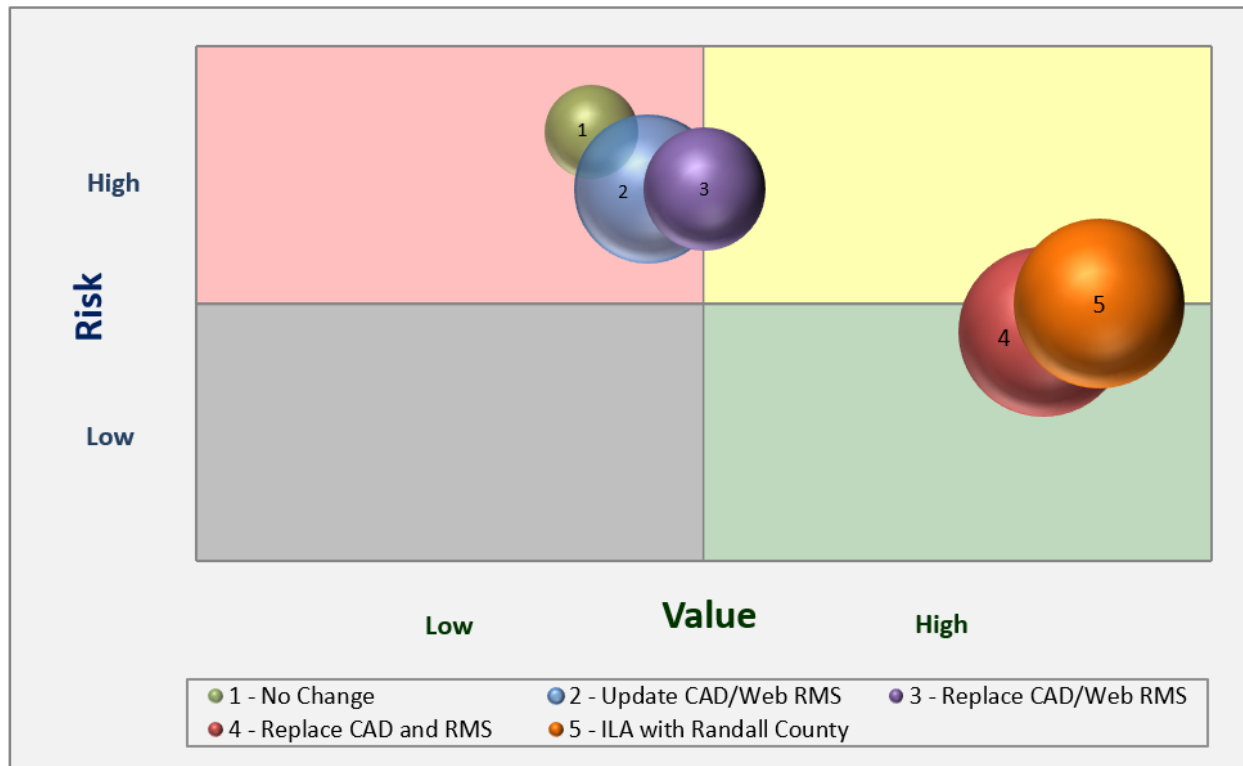
Value/Risk Analysis Results

The Committee evaluated each alternative on a scale of low, medium and high risk as it related to each of the Value/Risk criteria as shown below. A high level of Value receives a higher score (70-100%), while a high level of Risk receives a lower score (0-35%).

Direction	Value						Total Score
	Officer Safety	Workflow	Reporting/ Analytics	Vendor Support	Systems Management	Inter-operability	
1 - No Change	Low	Low	Low	Low	Medium	Low	39%
2 - Update CAD/Web RMS	Low	Medium	Low	Low	Medium	Low	44%
3 - Replace CAD/Web RMS	Medium	Low	Medium	Medium	Low	Low	50%
4 - Replace CAD and RMS	Medium	High	High	Medium	High	Medium	83%
5 - ILA with Randall County	High	High	High	Medium	Medium	High	89%

Direction	Risk						Total Score
	Disaster Recoverability Risk	Functional Risk	Integration Risk	Vendor Risk	Product Architecture Risk	Governance Risk	
1 - No Change	High	High	Medium	High	High	Low	17%
2 - Update CAD/Web RMS	High	Medium	Medium	High	Medium	Low	28%
3 - Replace CAD/Web RMS	Medium	Medium	High	Medium	High	Low	28%
4 - Replace CAD and RMS	Low	Low	Medium	Medium	Low	Low	56%
5 - ILA with Randall County	Low	Low	Low	Medium	Low	High	50%

The results of the qualitative Value/Risk analysis indicated the following graphic within the risk value quadrants. The size of the bubble represents the total 5-year cost.



The results indicate that the alternative with least desirable combination of value-risk (i.e., the lowest relative value and highest risk) is option 1 - The Do Nothing alternative. Option 2 – update the Intergraph CAD and transition to Web RMS was the second least favorable result with high risk and relatively low value.

The analysis pointed to option 5, an Interlocal Agreement with Randall County, as having a desirable combination of value-risk (i.e., highest relative value and lower long-term risk) with respect to the other alternatives. The risk of implementing successful governance with the County resulted in a slightly higher risk factor. Option 4 – Replacement of both the Intergraph CAD and I/LEADS RMS with a new system solution produced a similar result to the Interlocal Agreement solution with the evaluated risk slightly lower; however, the evaluated value was slightly lower than option 5 due to the potential missed opportunity of sharing information and operation integration from the City through the County’s system (i.e., mugshots from the County JMS to the Patrol cars’ MDT).

Alternatives Cost Analysis

Alternatives Cost Results

Shown in the below table are the estimated costs the City will incur for each of the proposed alternatives. A 5-Year Cost Analysis was developed and each alternative was scored based on the Total 5-Year Cost to the City. The scores shown below are reflected in the final scoring of each of the alternatives found on page 16.

Direction	Estimated Costs						Score
	Year 1	Year 2	Year 3	Year 4	Year 5	Total	
1 - No Change	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$1,000,000	100%
2 - Update CAD/Web RMS	\$552,220	\$552,220	\$552,220	\$446,400	\$446,400	\$2,549,460	39%
3 - Replace CAD/Web RMS	\$1,157,820	\$192,220	\$196,540	\$95,256	\$100,019	\$1,741,855	57%
4 - Replace CAD and RMS	\$1,236,100	\$1,326,140	\$239,652	\$251,635	\$264,216	\$3,317,743	30%
5 - ILA with Randall County	\$1,248,100	\$1,338,140	\$251,652	\$263,635	\$276,216	\$3,377,743	29%

Note: Option 5 – ILA with Randall County includes projected network costs of \$1,000 per month to link the County and the City with 1 GB fiber.

Full CAD/RMS Replacement Cost Breakdown

As a reference to options 4 and 5, the table below breaks down each of the individual components required for a full CAD/RMS/Mobile System Replacement. The total estimated 5-year cost is \$3,317,743.

	2020	2021	2022	2023	2024	Total
Public Safety Systems Replacement						
CAD	\$1,052,000	\$86,400	\$90,720	\$95,256	\$100,019	\$1,424,395
CAD Servers	\$30,000					
Message Switch	\$30,000					
CAD Workstations Hardware	\$80,000					
CAD Software	\$360,000					
Interfaces (E-911, RMS, etc.)	\$120,000					
Project Management/Integration	\$240,000					
Data Conversion	\$120,000					
Training	\$72,000					
CAD System Maintenance		\$86,400	\$90,720	\$95,256	\$100,019	
RMS	\$30,000	\$1,037,400	\$98,280	\$103,194	\$108,354	\$1,377,228
RMS Server	\$30,000					
RMS Software		\$450,000				
Interfaces (CAD, NCIC, Mugsot, etc.)		\$96,000				
Project Management/Integration		\$273,000				
Data Conversion		\$136,500				
Training		\$81,900				
RMS System Maintenance			\$98,280	\$103,194	\$108,354	
Mobile Computing	\$154,100	\$202,340	\$50,652	\$53,185	\$55,844	\$516,120
Notebooks/Mounts/Installation	\$0					
Mobile Dispatch Software	\$134,000					
Field Reporting Software		\$134,000				
Training	\$20,100	\$20,100				
Mobile Systems Maintenance		\$48,240	\$50,652	\$53,185	\$55,844	
Total	\$1,236,100	\$1,326,140	\$239,652	\$251,635	\$264,216	\$3,317,743
	2020	2021	2022	2023	2024	Total
Total System						
Hardware	\$170,000	\$0	\$0	\$0	\$0	\$170,000
Software	\$494,000	\$584,000	\$0	\$0	\$0	\$1,078,000
Services	\$572,100	\$607,500	\$0	\$0	\$0	\$1,179,600
Maintenance	\$0	\$134,640	\$239,652	\$251,635	\$264,216	\$890,143
Total City 5-Year Cost	\$1,236,100	\$1,326,140	\$239,652	\$251,635	\$264,216	\$3,317,743

Estimated Timelines

Shown in the below table are high-level estimated timelines and project durations for each of the assessed alternatives. The project durations presented are estimates based on information gathered during City interviews and previous experience with other municipalities who have implemented similar-sized CAD/RMS systems.

ID	Task Name	Q1 19	Q2 19	Q3 19	Q4 19	Q1 20	Q2 20	Q3 20	Q4 20	Q1 21	Q2 21	Q3 21	Q4 21
1.	Option 1 – Maintain the current system – Do Nothing												
2.													
3.	Option 2 – Update Intergraph CAD / transition to Web RMS												
4.	1. Contract Negotiation of Intergraph CAD Upgrade												
5.	3. Project Implementation												
6.	A. Comprehensive Planning												
7.	B. CAD and Mobile Dispatch												
8.	C. Intergraph Web RMS and Field-Based Reporting												
9.													
10.	Option 3 – Replace Intergraph CAD / transition to Web RMS												
11.	1. CAD RFP Development												
12.	2. Evaluation and Selection of a CAD Vendor												
13.	3. Project Implementation												
14.	A. Comprehensive Planning												
15.	B. CAD and Mobile Dispatch												
16.	C. Intergraph Web RMS and Field-Based Reporting												
17.													
18.	Option 4 – Replace both Intergraph CAD and /LEADS RMS												
19.	1. RFP Development												
20.	2. Evaluation and Selection of a Vendor												
21.	3. Project Implementation												
22.	A. Comprehensive Planning												
23.	B. CAD and Mobile Dispatch												
24.	C. RMS and Field-Based Reporting												
25.													
26.	Option 5 – Interlocal Agreement with Randall County												
27.	1. Project Governance Agreement with Randall County												
28.	2. Project Implementation												
29.	A. Comprehensive Planning												
30.	B. CAD and Mobile Dispatch												
31.	C. RMS and Field-Based Reporting												

Final Analysis Results

Total Scores and Results

The final results and total averaged scores (i.e., Value Score, Risk Score, and Cost Score) are represented in the table below.

#	Direction	Estimated 5-Year Cost of Ownership	Duration of Project (months)	Assessed Areas			
				Value Score	Risk Score	Cost Score	Total Score
1	Maintain the current system – Do Nothing	\$1,000,000	0	39%	17%	100%	42%
2	Update Intergraph CAD / transition to Web RMS	\$2,549,460	20	44%	28%	39%	37%
3	Replace Intergraph CAD / transition to Web RMS	\$1,741,855	22	50%	28%	57%	43%
4	Replace both Intergraph CAD and I/LEADS RMS	\$3,317,743	34	83%	56%	30%	62%
5	Interlocal Agreement with Randall County	\$3,377,743	34	89%	50%	30%	61%

In conclusion, the highest scored alternative path is Option 4 - Replace both the Intergraph CAD and I/LEADS RMS with a new integrated system solution. This solution provides the lowest overall risk and second highest value. This alternative path has an estimated 5-year cost of ownership of \$3,317,743 and will take approximately 34 months to implement.

The second-best alternative for the City is Option 5 – An Interlocal Agreement with Randall County. This option provides the highest overall value in terms of data sharing with the County to have a streamlined workflow from the CAD to the RMS to the JMS in order for Patrol Officers to get access to mugshots and more detailed suspect information. It is important to note that the governance behind this solution is difficult to manage requiring constant communication and agreement with the County. This alternative path has an estimated 5-year cost of ownership of \$3,377,743 and will take also approximately 34 months to implement.

Option 2 – Update the Intergraph CAD and transition to Web RMS is a high cost solution which provides little value in terms of functionality, reporting, Vendor support, and Officer safety. High cost upgrades are required every 2-3 years, which require a recurring investment of \$1-1.5 million just to keep the system running. This is the least recommended alternative based on high cost, high risk of system support.

Option 1 - Maintain the current system – Do Nothing, is also not recommended. While it may be lowest cost option, the system has an extremely high risk of total failure.