King County Smart Building Management System
King County Department of Information Technology
King County GIS Center

2023 URISA Exemplary Systems in Government Award – Enterprise Systems Application

Application Outline

Section A:
1. Name of System and ESIG Category
   a. Name of System: King County Smart Building Management System
   b. ESIG Category: Enterprise Systems Application
2. Letter from King County Chief Technology Officer Stephen Heard, authorizing this submission
3. Summary of what the King County Smart Building Management System accomplishes and why it is exemplary
4. Five (5) user testimonials

Section B:
1. Jurisdiction information

Section C, D, E, F:
   C. System Design
   D. Implementation
   E. Organizational Impact
   F. System Resources

Appendix:
1. Illustrations and Figures
June 2, 2023

Subject: Application for the 2023 Urban and Regional Information Systems Association (URISA) Exemplary Systems in Government Award - King County Smart Building Management with ArcGIS Indoors

Dear URISA ESIG Award Review Team,

The King County Department of Information Technology is pleased to submit this application for the 2023 Urban and Regional Information Systems Association (URISA) Exemplary Systems in Government Award.

Key assets for any government jurisdiction include its residents, its geography, and its employees.

County facility and space management was a challenge before the Covid-19 pandemic. After its impact became clear, effectively managing facilities and supporting employees working remotely became daunting.

The King County Department of Information Technology with the King County GIS Center leveraged its data and technology expertise to address the enterprise facility and space management challenges during the Pandemic. More importantly, the King County’s Smart Building Management System was designed and developed with the future in mind.

The Smart Building Management System facilitates an effective return-to-office or hybrid approach for County employees. It aligns with the County’s future of work initiatives to leverage the County’s workforce assets while supporting individual career and life-balance goals. It leverages the County’s geographic assets by consolidating and locating customer services for maximum efficiency and effectiveness. Consolidating in-office workspace after two high occupancy downtown Seattle buildings were closed, King County leaders can make data driven decisions on future space management based on utilization patterns.

As King County CTO, I am proud to nominate the King County Smart Building Management System for this prestigious award.

Sincerely,

Stephen Heard
King County Smart Building Management System

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Application Section A.3

What the King County King County Smart Building Management System accomplishes

The King County Smart Building Management System (the System) was designed and implemented to address several county government facility management and utilization issues. Most of these issues existed before, but the Covid-19 pandemic resulted in even greater challenges and the need to rethink how buildings and space within buildings are optimized.

King County, with 2.3 million residents, 15,000 county employees, and 105 county facilities distributed across 2307 square miles from Puget Sound to the crest of the Cascade Mountains, faced facility management challenges during normal times. Many County facilities provide direct services to residents. In downtown Seattle the County Campus includes seven staffed buildings, a parking garage, and vacant land (Figure 1). Before the pandemic virtually all county employees worked in a traditional dedicated workspace. Once the pandemic impact on the health of employees working in a traditional office environment was clear, in 2020 about 7000 county employees transitioned overnight to remote work. In 2023 many employees transitioned to a hybrid environment, working various proportions of time at home or on-site.

After addressing initial needs, the System was developed by combining geospatial technology, office productivity software (MS Outlook, 365, Microsoft Intune - unified endpoint management service, etc.), GIS and CAD data, and a building information management system (Figure 2).

The System was implemented for two buildings in phase one. A total of five buildings were added in phase two. Key features of the System include:

- Hoteling approach with a workspace/desk reservation system
- Responsive to employee needs for onsite productivity, including way finding
- Consolidated customer facing services in a single downtown Seattle location
- Reservation manager system allowing designated individuals to book workspaces for other members of the department
- Training and user material
- Include all building features an employee would want to know (not just desks/office space)
- Space management dashboards at the facilities and department level
- Supporting accurate real-estate cost allocations by Facility Management to end-user agencies
- Facilitating the repurposing of unneeded space/buildings

The system design was not just reactive, but forward thinking. The System was designed to respond to citizen needs and expectations and enable the county’s workforce to thrive in a new hybrid work environment.

Why the King County Smart Building Management System is exemplary

The King County Smart Building Management System is exemplary because it addressed one of the most basic needs for every employee across the King County government. Two lead agencies (King County GIS and King County Facilities Management) partnered to steer the development. The System envisions and meets multiple agencies business needs. It envisions and meets the needs of an effective and modern work force. The System envisions and meets the needs of the public who rely on county services. And it integrates multiple technologies into a single cost-effective system in ways that were not envisioned by any of the individual technologies utilized.
**King County Smart Building Management System**

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**Application Section A-4, User Testimonials**

The ArcGIS Indoors [King County Smart Building Management System] allows me to reserve a space for days I come into the office and is helpful because it is nice to be able to book a space I know I like and can feel productive in. I use this system 1-3 times a month.

*Renee Leichliter, Administrative Specialist III, DNRP Water & Land Resources Division*

Smart Building Management with ArcGIS Indoors, has made it easy for me to reserve “hoteling” office workspaces that King County is providing us as we come into the office for meetings and to meet with our supervisors and coworkers. I generally reserve a location every Friday, and on days with important functions and critical customer support needs. I have been able to view a map of the floor that I’m working on and select a hoteling desk location that is in an area that works best for me – close to the restroom and kitchenette (441-B). I’ve also been able to visualize which locations have folks already reserving desks so that I know the density, and thus potential background noise I may experience. The visual layout is very handy and even shows the locations of other assets like meeting rooms and stairwell, which has been so important for me, as having not been to the office on a daily basis, I don’t have those room numbers memorized.

*Kendra Ninke, Functional Analyst II, Department of Community & Human Services*

I use the ArcGIS Indoors [Smart Building Management System] on a weekly and sometimes more frequent basis. Being able to reserve a space ahead of time allows my team to coordinate when we can be in the office together. With a little planning we are able to locate ourselves near one another and create some of that missing synergy you get from working physically near someone. The system is also flexible when plans change and you need to update or cancel a reservation.

*Jason Rich, Capital Improvement Program Managing Supervisor, Department of Natural Resources & Parks*

I generally use the ArcGIS Indoors [King County Smart Building Management System] twice a week to reserve a work space to perform administrative tasks for the Parks GWWW staff by utilizing the assets that the DNRP 5th floor provides: Copiers, binding machines, plotters, office supplies, etc. to perform administrative duties that have a physicality to the job such as scanning, printing, mailings, proximity to the KC Print Shop for in person print job review & provide notice to proceed with production, performing Parks KSC fleet maintenance tasks, Sort incoming USPS, UPS, FEDEX, Inter-office mail & outgoing mail distribution. I utilize the ArcGIS reservation system to create a consistent rhythm for working downtown and getting my routine tasks completed that require the assets and services that KSC provides.

*Machelle Jones, Administrative Specialist III, Department of Natural Resources & Parks*

The ArcGIS Indoors [Smart Building Management System] site allows me to reserve workspaces for myself and rooms for my team members at our downtown office. In our hybrid working landscape, the site provides an efficient and visually understandable way for me to reserve workspaces in our otherwise confusing building. It is a helpful and wonderful asset for our dynamic workplace!

*Erin Irby, Project/Program Manager, Department of Natural Resources & Parks*
**King County Smart Building Management System**

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**Application Section B**

Jurisdiction Information

1. Name of jurisdiction:
   
   King County ([www.kingcounty.gov](http://www.kingcounty.gov))

2. Population served by the organization/agency:

   2,269,675 (2020 US Census)

3. Annual total budget for jurisdiction:

   $16.2 billion (biennial 2023-2024 budget) – see: [https://kingcounty.gov/council/budget.aspx](https://kingcounty.gov/council/budget.aspx)

4. Name, title, and address of chief elected and/or appointed official:

   County Executive Dow Constantine

   King County Chinook Building
   401 5th Ave. Suite 800
   Seattle, WA 98104

5. Name, title, address, telephone, FAX, and email for contact person for system

   Tamara Davis
   King County GIS Center Manager
   Chinook Building
   401 5th Ave Ste 600
   Seattle, WA 98104
   206-477-5755
   [Tamara.davis@kingcounty.gov](mailto:Tamara.davis@kingcounty.gov)
   [www.kingcounty.gov/gis](http://www.kingcounty.gov/gis)
King County Smart Building Management System

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Application Sections C-F

C. System Design

1. What motivated the system development?

The King County Smart Building Management System (the System) was designed and implemented to address several county government facility management and utilization issues. Most of these issues existed before, but the Covid-19 pandemic resulted in even greater challenges and the need to rethink how buildings and space within buildings are optimized.

King County, with 2.3 million residents, 15,000 county employees, and 105 county facilities distributed across 2307 square miles from Puget Sound to the crest of the Cascade Mountains, faced facility management challenges during normal times. Many County facilities provide direct services to residents. In downtown Seattle the County Campus includes seven staffed buildings, a parking garage, and vacant land (Figure 1). Before the pandemic virtually all county employees worked in a traditional dedicated workspace. Once the pandemic impact on the health of employees working in a traditional office environment was clear, in 2020 about 7000 county employees transitioned overnight to remote home-work sites spread across four counties (Figure 3). In 2023 many employees transitioned to a hybrid environment, working various proportions of time at home or on-site.

The development of the System was initially motivated by the disruption to King County employee work patterns caused by the Covid-19 pandemic beginning in 2020. The first challenge was supporting the 7000 remote-work employees with access to IT services, support, and IT components that could not be done online. The County used GIS analysis of employee home locations to implement remote IT services centers. Service centers were located in County owned buildings that had small spaces available. The Service center locations were also chosen to be near concentrations of employee home locations eliminating the need to drive to the downtown Seattle County office campus (Figure 4).

Anticipating the end of the pandemic, as early as 2021 County leadership analyzed likely patterns of future work practices. Senior department leadership developed a Future of Work vision for County employees with objectives including:

- Equity
- Employee health, safety, wellbeing, engagement, and labor relations compliance
- Customer service, business needs, and operational needs
- Change management and communication plans
- Budget planning and cost avoidance
- Climate change, sustainability, and efficiency
- Legal and regulatory compliance
- Worksite changes.

The realization that some employees would return to traditional office environments, while others would utilize a variety of remote or hybrid office patterns, led to a search for ways to manage the utilization of County facilities and space within those facilities.
The System is a King County, enterprise-wide system – each County employee needs a place to work, usually within a County facility. The System is designed to meet the needs of an effective, modern workforce, whether working on-site, remote, or hybrid schedules, and even if an employee’s work location needs to change throughout the year. The planning, design, and implementation was an enterprise effort also, with the County’s Facility Management Division partnering with King County IT and the King County GIS Center.

2. What specific service or services was the system intended to improve?

The County’s Future of Work planning led to a variety of goals that the System was designed to accommodate:

- Align with the varying business needs of individual departments for employees working all on-site, all remote, or hybrid (part-time on-site/part remote).
- Consolidate multiple department public face to face service counters spread across downtown Seattle into a single, one-stop County Service Center.
- Allow an employee working a remote or hybrid pattern with need for short to mid-term onsite workspace to reserve a space via a hoteling application, while integrating this application with MS Outlook and appropriate maps and wayfinding functionality.
- Allow employees to select short to mid-term workspace provisioned with the needed technology and office amenity components and in proximity to other required office resources (conference rooms, computer peripherals, parking/transit, rest areas, lunchrooms, etc.).

The formal King County IT Project Intake Documentation described the Business Needs against multiple use cases:

**As a CXO** I need to have insight into employee/visitor productivity and engagement, efficient asset/resource use and investment, and reduce decision time, cost.

**As Operations Management** I need to manage work location analysis and assignment/reassignment based on social distancing parameters, the efficient asset/resource use and investment, efficient response to maintenance/service issues, employee health safety, minimize spread of COVID-19 virus.

**As Security Operations** I need to manage efficient emergency planning and response, incident locations, response times.

**As a County Employee** I need to be able to manage space reservations for drop-in encounters in county facilities; generate workflows for cleaning requests, and interact with a visual map of county office space.

The King County IT Project Intake Documentation also defined additional current and future state characteristics:

**Current state:** The is no solution that currently exists in this space.

**Future state:** ArcGIS Indoors extends the ArcGIS platform to create a facility information system of record by providing a complete indoor mapping system for creating, managing, and sharing workplace maps and location data. It improves business operations and provides for enhanced employee, contractor, and visitor visibility, mobility and engagement. With ArcGIS Indoors, users can access robust
capabilities for facility information management and sharing, space assignment and management, work location reservation, asset tracking and maintenance, indoor map and app making, and wayfinding.

**Future Solution Users:** All employees of King County.

**Risk reduction & opportunity enablement:** ArcGIS Indoors extends the ArcGIS platform to create a facility information system of record by providing a complete indoor mapping system for creating, managing, and sharing workplace maps and location data. It improves business operations and provides for enhanced employee, contractor, and visitor visibility, mobility and engagement. With ArcGIS Indoors, users can access robust capabilities for facility information management and sharing, space assignment and management, work location reservation, asset tracking and maintenance, indoor map and app making, and wayfinding.

**Time criticality:** Solution needs to be emplaced prior to July 5 return to the hybrid work.

3. **What, if any, unexpected benefits did you achieve?**

Many of the evolving future of work patterns resulted in potential space savings:

- Staff that could work mostly from home freed-up office space.
- Staff working a hybrid pattern freed up net office space.
- Consolidating multiple department face to face service counters into a single County Service Center also resulted in net space savings.
- The County Service Center also resulted in an improved customer experience.
- All of the individual department space saving potential freed up enough space that two County buildings could be mothballed, resulting in maintenance and energy savings, plus the potential for future sale or repurposing of this valuable downtown real estate.

4. **What system design problems were encountered?**

King County was a front-runner in the development of ArcGIS Indoors. Through the close partnership between Esri’s Indoors product management and developer teams and the KCGISC team, product and deployment features were enhanced, evolved, and better tailored to meet the practical needs of all customers for a more seamless experience. Examples include:

- Microsoft Intune (unified endpoint management service) is a requirement for King County to use any mobile apps for services. Esri teams adapted ArcGIS Indoors implementation to support this service, which allowed subsequent customers to bypass this hurdle.
- We needed the ability to synch Occupant data nightly and avoid manual account management which would be completely unsustainable. We had Esri build a Python ETL to synch data. Esri’s Indoors team identified the Python piece as a functional gap and has since developed a geoprocessing tool that will handle the deltas and logic assessment to evaluate account changes (Figure 2).
- Integration with Microsoft 365 was built using the Graph API allowing resource mailboxes to be populated with appropriate cube records to ensure reservations for cubes and offices could be properly stored (Figure 2). Updates to ArcGIS
Indoors came with the Reservation Layer which now serves the purpose of housing space reservations.

5. What differentiates this system from other similar systems?

ArcGIS Indoors has enabled King County to build an indoor GIS and put the power of indoor mapping, wayfinding, and space management software into everyone's hands. Building Information Management (BIM) software is primarily used for design, build and commissioning hand off for construction projects without true consideration for geography. With ArcGIS Indoors on the ArcGIS platform GIS doesn’t begin and end inside the building but continues throughout the geographic extent needed for a region which may or may not include other buildings (Figure 5). ArcGIS Indoors compliments existing systems with the ability to integrate with various asset management software. Extending capabilities such as facilities asset management – strategically routing work orders to technicians based on location, safety and security operations (mapping fire exits, fire extinguishers, etc.), customer information boards could use wayfinding kiosks in public buildings such as courthouses with multiple courtrooms.

As an enterprise system King County could consolidate asset and space information into a single place, the indoor map, and provide easily accessible web and mobile apps without needing specific expertise of a given technology.

It is also an exemplary enterprise system because every single County employee needs a location to work, at least part of the time. The County workforce is one of the top (if not the top) assets to serve the citizens of King County. The System helps each County employee do their job well with the best tools, in the right place, at the right time.

D. Implementation

1. What phases did you go through in developing the system?

The System was developed through King County IT’s Project Request Intake, Resourcing, Approval, and Design Phase process.

King County Chief Technology Officer Stephen Heard was both Business Sponsor and Product Owner. Mr. Heard was liaison with the Facility Management Division project requestors.

Project phases included:

- IT Project Intake Documentation
- Intake Analysis and Project Scoring
- Business Analysis
- Project staff resourcing
- Project cost estimating and source of funds identification
- Architectural design
- Data wrangling (floor plans)
- System design
- System development
- O&M Plan development
- User documentation
- Go live (Phase One)
- Phase Two
2. Were there any modifications to the original system design? Why? What?

Recognizing that each agency may want to manage their hotel spaces differently and want varying levels of control, King County GIS implemented Agency Captains and Administrators who would be responsible for internal communications. Eventually, these individuals would also be responsible for governing cubicle or hotel management within the Reservation Manager.

As the System evolved, individual Agency Captains could define ‘Hotels' for their own employees, for business-line specific responsiveness to optimal work environment needs.

E. Organizational Impact

1. What user community does the system serve and how?

The System serves the needs of all County employees, especially the 7000 who work in a hybrid environment.

The System also serves the needs of individual County agencies, allowing them to manage portions of dedicated space as Agency Hotels with their own Agency Captains.

The System also serves King County Facility Management, both by putting control of space in the hands of agencies and employees, and by giving Facilities modern tools for traditional facility management functions, like maintenance, janitorial services, remodeling, work-order management, etc.

Lastly, the System serves the County as a whole and the citizens and taxpayers of the County by enabling public facing services to be consolidated in one building. The System enabled workspace consolidation after the closure of two older high occupancy buildings for future repurposing or disposal.

Each System user community is supported by targeted and easy to access Training Material, including general system information, FAQs for end-users, FAQs for Agency Admins (Captains), and help-desk information (Figure 7).

Another example of how the System was designed with users in mind was the development of extensive System O&M (operations and maintenance) documentation (Figure 8a). For example, the documentation explains to Agency Captains how to add users to the office space Hotel they are responsible for (Figure 8b).

2. What are the ultimate decisions/operations/services being affected? If appropriate, provide a few examples including, but not limited to: screen input/output forms, paper products, or other descriptive graphics.

Individual users can find and reserve appropriate office space, similar to reserving a hotel room, but with added functionality to select the specific location of the space (including proximity to other users and office amenities (Figure 12).

Individual agency Hotel Captains can manage and monitor usage of their department’s allotted space with a responsive and flexible System/Facility Hotel Utilization Dashboard (Figure 13).

Facilities Management can manage and monitor the entire campus usage and excess availability via a System Facility/Hotel Utilization Dashboard (Figure 14).
3. What were the quantitative and qualitative impacts of the system?

Quantitatively, 7000 County employees now have access to the System. The two phase one buildings have a combined 21 floors and 625,413 square feet mapped, with a total 588 reservable workspaces and capacity for 3,400 employees.

Qualitatively, the System enables remote work and hybrid-schedule employees to easily and accurately reserve the specific space they need when working on-site. Because the System is integrated into MS 365 Outlook, it is an intuitive system that is easy and efficient to use. The System was designed to align with the County’s Future of Work initiative and enable a successful workforce to achieve individual career goals.

In addition, System/Facility Hotel Utilization Dashboard (Figure 13) and System Facility/Hotel Utilization Dashboard (Figure 14) enable Agency Captains and Facility Management to have a current view of space utilization.

The System is also the basis for Facility Management to more effectively manage agency space allocation, billing agencies accurately for space utilization, and managing janitorial services, maintenance tickets, and future space remodeling/reconfiguration.

The System has also enabled the County to close two old buildings – The 112 year old Yesler Building and the 50 year old Administration Building (Figure 15). This real estate can either be sold or the land repurposed for other downtown Seattle amenities.

4. What effect has the system had on productivity?

When the pandemic started in 2020, staff working from home also left behind their traditional workspace. A ‘do-nothing’ approach would have been wasteful once work from home and hybrid schedules were standardized after the pandemic restrictions ended and the County Future of Work vision was implemented.

With this System, end user productivity has been enhanced by enabling staff working hybrid schedules or work-from-home schedules to easily reserve appropriate space when and where they need it.

Productivity for Facility Management has been greatly enhanced by giving them indoor facility management support tools that never existed before.

5. What, if any, other impacts has the system had?

In addition to the impacts described in previous sections, the System has enabled other county agencies to envision new applications. For example, the County’s Wastewater Treatment Division is considering integrating ArcGIS Indoors System for its wastewater treatment facilities (Figure 16). These plants are highly complex facilities with few employee workspaces, but many complex locations, including process equipment, process control installations, maintenance facilities, stores and spare parts spaces, etc. Wastewater Treatment is planning to utilize System components to enhance operations and maintenance for what is a highly complex industrial facility.

6. How did the system change the way business is conducted with and/or service delivered to clients? Give specific examples comparing the old way with the new.

Key features of the System that represent new ways of doing business include:

- Hoteling approach with a workspace/desk reservation system
- Responsive to employee needs for onsite productivity, including way finding
- Consolidated customer facing services in a single downtown Seattle location
- Reservation manager system including training and user material
- Include all building features an employee would want to know (not just desks/office space)
- Space management dashboards at the facilities and department level
- Supporting accurate real-estate cost allocations by Facility Management to end-user agencies
- Facilitating the repurposing of unneeded space/buildings

The system design was not just reactive, but forward thinking. The System was designed to respond to citizen needs and expectations, and to enable the county’s workforce to thrive in a new hybrid work environment.

**F. System Resources**

1. **What are the system’s primary hardware components?** Give a brief list or description of the hardware configuration supporting the system.

   The System was designed to integrate with Esri’s hosted environment and the King County IT Microsoft Azure Cloud environment. Within the Azure Cloud, the System integrates an Esri Geodatabase with Microsoft 365 products (Figure 2).

   On the output side, users access the System through a variety of existing devices, including PCs, laptops, tablets, kiosks, smartphones, etc. Employees can also use their personal devices via appropriate Microsoft or Esri ArcGIS login.

   A primary objective was to enable the King County workforce to utilize the System via the hardware and office productivity tools that they already use.

2. **What are the system’s primary software components?** Describe the primary software and, if a commercial package, any customizations required for the system.

   The system architecture combined a variety of standard software resources in an innovative design (Figure 2). The core was Esri ArcGIS Pro and Esri’s ArcGIS Indoors product.

   Microsoft 365 office productivity tools, including MS Outlook, provided the system link for individual County employees. Microsoft Graph API provided restful access to Azure Cloud services.

   LDAP (Lightweight Directory Access Protocol) is used to validate access via the County's active directory control/access system.

   Informatica is used for the System enterprise cloud data management and data integration functions.

   Python scripting was used to serve data and functionality to individual end-users, enable individual County agencies to manage dedicated space as office hotels for their employees, and to consume facility floor plan information.

3. **What data does the system work with?** List and briefly describe the database(s).

   The System data architecture (Figure ) relies on a variety of GIS and non-GIS data:
Using Microsoft 365 and Informatica individual County employee data and resource (locations, conference rooms, etc.) data is synched, stored and accessed by the system.

Within the County’s enterprise geodatabase, GIS, Agency Hotel, and Floorplan data is stored.

A particular challenge was compiling current accurate floor plans for each floor in County buildings. Some source data was available in AutoCAD format (Figure 9). Other floor source data was only available in PDF or paper drawing format. All of these needed to be converted to an ArcGIS Indoors compatible format as part of the project. In addition, some of the source documentation was out-of-date. Some floor plans were being modified as the project was being designed. King County GIS project staff had to work with Facilities Management and individual agency contacts to ensure that as the System was rolled out, the floor plan data was accurate and could be kept accurate in the future.

Standardized floor plans (Figure 10) are a key component of the System. They enable manipulation of the data sources for an entire building for planning and visualization purposes (Figure 11).

4. What staff resources were required to implement the system? (i.e., report approximate staff and consultant time as FTE’s)

Staff resources included:

- Project intake management via KCIT
- Project management via KCIT
- Business analysis via KCIT
- GIS system engineering via KGIS
- GIS analysts via KCGIS
- Quality Assurance via KCIT
- Data scientist via KCGIS
- Productions operations via KCGIS
- Digital engagement consulting via KCIT

In addition, for ArcGIS Indoors expertise, the County relied on Esri, via King County GIS Center’s Esri Advantage Program relationship. Esri considers King County an early-adopter agency and was responsive with technical expertise and with modifications to the Indoors product to help meet the County’s business needs.

5. Comment on anything unusual about the resources used to develop your system, such as data, software, personnel and financing.

There were several key success factors in the development of the King County Smart Building Management System that are likely unusual for the typical municipal GIS operation.

First – King County GIS was established as a separate internal service within County government. KCGIS manages its own finances and budget, but this also means that it has to be highly entrepreneurial and customer focused. Facility Management (and most other County agencies) were previous or current customers of KCGIS, so we had existing relationships to build upon.
Second – King County GIS has an existing strong governance structure that helps to set priority initiatives.

Third – King County GIS is located within the King County IT Department. By County Code, the CIO is responsible for KCGIS. KCIT has developed strong ITIL-based practices that ensure that projects are selected based on clear priority criteria, vetted via a structured intake process, further vetted by a formal Project Review Board, and architected, designed, developed, and put into operation with well documented and adequately resourced processes.

Fourth – King County GIS is the steward of the largest data resources within King County by far. This is not unusual for the typical municipal GIS. But King County GIS is resourced with spatial data scientists and administrators who were not daunted by the challenges of this project.

Fifth – King County GIS has a long and strong relationship with Esri. Esri considers KCGIS an early adopter agency. The KCGIS relationship with Esri is strengthened via its Advantage Program, allowing KCGIS to bypass a lengthy procurement process for system selection and provides priority access to highly responsive technical resources. This was a critical success factor throughout the project life cycle. KCGIS also has experience working with data in AutoCAD format, as well as other COTS and open-source software.

Sixth – Personnel. With more than two-dozen professional GIS staff members, KCGIS had the breadth of competencies necessary to execute the project. This was aided by strong line-of-business relationships with KCIT workgroups, including data science, system and data architects, software engineering, production operations, business analysts, and project management. King County’s staff resources were also supplemented with Esri resources when needed.

Seventh – Financing. This project required many hundreds of thousands of dollars of financial resources. Sources of financing included:

- Repurposing some GIS staff from previously agreed priority initiative work (as agreed with GIS governance) to this Enterprise-wide priority initiative.
- Other sources came from KCIT priority initiative funding.
- KCGIS also utilized Esri technical resources via service credits included in the KCGIS Esri Advantage Program.
King County Smart Building Management System

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Appendix: Illustrations and Figures

Figure 1 – King County’s Downtown Seattle Campus

Figure 2 – System Architecture
Figure 3 – King County Employee Work Locations Across Four Counties

Figure 4 – KCIT Distributed Tech Centers Locations Based on GIS Analysis of Employee Concentrations
Figure 5 – Indoor mapping is not limited to the building or buildings themselves. Indoor mapping is integrated within the GIS platform.
Figure 6 - King County Smart Building Management System – ArcGIS Indoors Architecture
Training Materials

About the Indoor Viewer Training Guide
This guide is intended for any users of the Indoor Viewer system. It provides step-by-step instructions for main processes, like how to search for a desk, how to reserve a desk and how to modify/cancel a reservation.

About the Indoor Viewer - FAQ General End Users
This spreadsheet has a list of commonly asked questions for Indoor Viewer users, including who to contact for support.

About the Indoor Viewer - FAQ Agency Admin
This spreadsheet outlines how an Agency Admin can best support agency end users, including how to submit a ticket to the KCIT HelpDesk and FMD Customer Care.

About the Agency Admin - How to Submit a KCIT HelpDesk Ticket
This PDF contains instructions for an Agency Admin to submit a KCIT HelpDesk ticket for IT support related to the Indoor Viewer system.

Figure 7 – System Training and Help Material
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Figure 8a – O&M Document Outline
6.1.1 Adding/Deleting Users

To manage (add/delete) a new ZZ Group association to an Indoors Hotel.

1. Create a new Indoors Hotel in the Space Planner application.
2. From the AREA table on the Indoors hosted feature layer (currently named "KC Indoors Space Planner Map _10072021_WFL1") for the Space Planner application, look at the table and note the AREA_ID and exact Area Name of the hotel.
3. Open the Microsoft Graph Explorer here: [Graph Explorer - Microsoft Graph](https://developer.microsoft.com/en-us/graph/graph-explorer)
4. Sign into the Graph explorer with you KC credentials, it has single sign-on experience

5. Enter the following in the “query” section to run:

   `https://graph.microsoft.com/v1.0/groups?$filter=startswith(displayName,'ZZGrp, RM All Staff')`

   Note: Change the query to whatever the name of the ZZ Group is that you need to setup new in the Indoors system.

   *Figure 8b – System O&M Documentation, Section 6.1.1*
Figure 9 – Source AutoCAD File

Figure 10 – Typical Floor Plan Detail Showing Space Types/Amenities
Figure 11 – 3D Depiction of Converted Floorplans
Figure 12 – Typical System Reservation Floor Plan View

Figure 13 - System Facility/Hotel Utilization Dashboard
Figure 14 – System Campus Utilization Dashboard

Figure 15 – Some of King County’s Downtown Seattle Buildings
Figure 16 – Typical Wastewater Division Treatment Plant

Downtown Seattle