



# Kansas NG911 Indoor Mapping: A Pilot Study and Considerations for Kansas 911 Centers and School Districts

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## Introduction

Indoor mapping is essential for emergency services, helping first responders quickly navigate complex buildings. This document summarizes findings from a Kansas pilot project in which four vendors mapped the same two-story elementary school using different methodologies.

## Purpose

Indoor mapping can be quite expensive and challenging to implement, especially given the evolving technology and FCC requirements for locating 911 callers indoors. It can be difficult to decipher what you need from indoor mapping to support emergency response.

This document is intended to be a guide for Kansas PSAPs and the schools in their service areas to produce indoor maps that work for the school, the PSAP, and the emergency responders. While the focus is on schools, the same principles could apply to any public building.

This comparison will focus on emergency response and building safety concerns, but they are not the only purposes for indoor mapping. Building management and maintenance can be enhanced greatly by accurate indoor maps, for example, but these uses are outside of our expertise and the scope of this review.

## Methodology and Evaluation Criteria

To understand the current indoor mapping offerings, Kansas devised an indoor mapping pilot project in which four independent vendors mapped the same two-story school in Kansas. Each vendor was provided with DWG and JPG files of the school, as well as a list of the desired points of interest. While not a requirement, each vendor chose to do an onsite visit of the school for additional data collection purposes. The Kansas NG911 team assisted in coordinating vendor onsite visits with the local PSAP and the school district.

We requested a complete delivery of the data collected (including files not part of a typical delivery) for evaluation in ArcGIS Indoors and the existing Kansas NG911 call handling environment and applications.



Each data delivery was then reviewed using the same criteria: overall quality and completeness of the data, the level of effort integrating and maintaining the data, the ease of use and integration in both ArcGIS Indoors and the Kansas NG911 call handling mapping solution, as well as a comparison of development and maintenance costs and responsibilities.

## Summary of Findings

Each vendor visited the school site and delivered a form of indoor mapping data, but that is where the commonality ends. Each vendor used their own data collection method, and most, but not all included an ArcGIS Indoors compatible geodatabase. Additional data collected also varied and included LiDAR point clouds, AutoDesk files, GeoPDFs, drone imagery, and 360 degrees pictures of each room.

The ArcGIS Indoors geodatabases were the easiest to work with, that is assuming you have some GIS knowledge and an ArcGIS Indoors license. All the ArcGIS Indoors data delivered had limited attribution, and none contained usable or consistent Z (elevation) values. There were variations in what was included with each feature class, as well as major differences with how lines and polygons were represented for individual elements such as wall thickness and large areas like gymnasiums.

Indoor mapping data for NG911 is in its infancy stage and with good reason. Currently, there is no national NG911 indoor mapping standard or formally recognized indoors data model. The NENA 3D Data Model is under development while simultaneously NG911 call handling software providers are actively exploring how to ingest, interpret and display indoor mapping data in an intuitive, easy to understand manner.

Therefore, Kansas has developed the following list of things to consider as a guideline for Kansas PSAPs and their local project partners who are currently interested in purchasing or developing indoor mapping data. These considerations are specifically for using indoor mapping data in the Kansas NG911 ecosystem. It can't be stated enough that indoor mapping for use in NG911 is still evolving, so this list of considerations should change and improve once more information and supporting national standards for NG911 indoor mapping are available.

## Things to consider before starting an NG911 Indoor Mapping project

Within the Kansas NG911 system, the current practical use of indoor mapping data is limited to two items:

- Displaying integrated floor plans with specific points of interest like doors, fire extinguishers, or security systems identified and a floor picker available for multi-story buildings.



- Using address polygons within the Council's geocoders to attempt to identify the nearest room number or unit number to a 911 caller.

While individual vendors each bring their unique flavor to that integration, it is important to understand that any other current use a vendor might offer would be outside of the NG911 system. Future potential uses of indoor mapping data, including using it to estimate the floor a caller might be on, are not fully defined yet in the Kansas NG911 system. These considerations have been addressed in the recommendations below as well as our current understanding allows.

A good starting place for a NG911 Indoor Mapping project would be to make a list and prioritize the buildings you want mapped and identify all the local points of contacts (other than the PSAP such as school district, building superintendent, etc.) needed as your project partner.

PSAPs, along with their local project partners, should prepare for an indoor mapping project by discussing the following:

- Determine if any building footprint digital files (DWG, JPG, etc.) exist and how they can be shared with the vendor.
- Coordinate and plan vendor onsite visits
- Prepare a points of interest/attributes list that you will want included in the data capture such as alarms, cameras, access points, etc.
- Confirm the local contact will assume the responsibility of reviewing and communicating corrections as well as maintaining the indoor mapping data once it has been delivered.

Confirm that the indoor mapping vendor is an existing RapidDeploy data partner, meaning their indoor data can be viewed in RapidDeploy's Radius and Lightning applications. While it is understood that RapidDeploy is working on a more vendor-agnostic solution, currently they only support designated data partners.

Ask each vendor for a list of data that will be included in the final data delivery. At a minimum, it should include:

- An ArcGIS Indoors compatible geodatabase
- If possible, a vector-based data format ready for sub address polygon addressing
- Any additional raster or vector data collected as part of the project
- A points of interest/attributes list

Inquire if elevation (also referred to as Z values, height above geoid, height above ellipsoid, floor height, etc.) values are included and how those values are calculated including the coordinate system, units of measure and if there is any additional cost to include elevation values.



Discuss the costs – is it a onetime cost and is there an annual data maintenance and/or other cost like a data hosting fee? What is all included in the annual cost?

Maintaining the indoor mapping data is just as important as creating the data. This brings up several questions you will want to discuss with your local project partners and the indoor mapping vendor before beginning your project such as:

- How are minor edits handled? How are major edits like a building remodel handled?
- Who is responsible for updating the data? How quickly is an edit reflected in the live data?
- What licensing or special training is needed to maintain the indoor mapping data?

And finally, be sure to confirm who owns the indoor mapping data, how the data is stored, and how you can access the data.

## **Conclusion**

Indoor mapping data integration and use in NG911 is still a work in progress. The Kansas Indoor Mapping Pilot Project allowed us the chance to investigate and provide insight into what type of indoors data is being collected and how it is displayed in the Kansas NG911 call handling environment. We learned a lot and we still have many questions. We will continue to ask questions and update or append this document as standards are developed, data models are adopted, and NG911 call handling software integration techniques are released.

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