

Case Studies in FM Technologies



From geographic information system (GIS) applications to climate sensors for library collections, from innovative HVAC and greenhouse gas (GHG) upgrades to space management tools and the use of gaming software and artificial intelligence, the breadth and depth of technologies available to educational facilities professionals has grown exponentially in recent years. APPA members are applying incredible technology and ingenuity to address facilities issues both old and new, and they are evolving to find the best solutions to serve their institutions' mission and goals.

Following are just a few case studies related to the use of technology in the campus or school setting. These pieces have been submitted by campus innovators as well as our leading business partners in technology, and they barely scratch the surface of the innovation and creativity occurring right now within the education enterprise.

Compiled by Steve Glazner



ADELPHI UNIVERSITY

Garden City, New York

Submitted by Laziza Rakhimova, Regional Marketing Manager, Ecosystem Energy Services
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CREATIVITY IN ENGINEERING

Educational institutions across North America are looking for ways to upgrade assets and reduce their campus energy consumption and GHG emissions. Many have set ambitious targets, such as 50% GHG reduction by 2025. Achieving these goals within tight financial constraints is challenging. However, there are solutions. Adelphi University is located on Long Island, New York. With a single project, the Adelphi campus was able to reduce their GHG emissions by 30%, increasing resiliency and energy independence. After project completion, campus yearly energy bills were reduced by 40%, resulting in an eight-year pay-back period on the project. Adelphi University had aging equipment in need of replacement. In addition, Hurricane Sandy had underscored that the municipal electrical grid could not always



be relied upon. The project addressed these asset renewal and resiliency issues. All of this was accomplished (GHG reduction, asset renewal, resiliency, and energy bill reduction) by considering and improving Adelphi’s entire energy system through implementation of combined heat and power (CHP) technology within the deep energy retrofit project. ●●●



AUBURN UNIVERSITY

FACILITIES MANAGEMENT

AUBURN UNIVERSITY

Auburn, Alabama

Submitted by Dan Whatley, P.E., Director of Maintenance (*wdw0013@auburn.edu*); and Shanda Foster, Director of Information Technology (*slf0015@auburn.edu*)

DATA ANALYTICS INCREASE SPEED AND ENHANCE SERVICE

For years, the facilities management team at Auburn University has been working toward becoming increasingly data driven. Recently, the operations team has made great strides with the implementation of a data analytics tool, Qlik. With Qlik, zone and shop supervisors can produce dashboards providing up-to-the-minute information that can be filtered in hundreds of combinations with a click of the mouse. Qlik users can quickly search and manage hundreds of work orders, easily identifying and assigning work based on age, priority, building, status, technician, trade, and many other categories. The convenience and speed with which data can be obtained has helped eliminate work orders from being

lost in the system and allows supervisors to balance workloads and track performance. In addition to reporting on work order data, the facilities team is leveraging Qlik to visually report on campus outages, construction projects, facility condition assessments, and many other data points. Although the team has been inputting these same data points for years, Qlik has empowered them to use this data to make informed business decisions, resulting in increased service levels to the campus community. ●●●





CLINTON PRAIRIE SCHOOL

Frankfort, Indiana

Submitted by Jennifer Payne, Performance Infrastructure Account Executive, Johnson Controls
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CREATING A BETTER LEARNING ENVIRONMENT WITH DISTRICT-WIDE TRANSFORMATION

Like many school districts, the Clinton Prairie School Corporation (CPSC) recently faced the daunting task of addressing aging infrastructure on a limited budget. To address necessary district-wide exterior and interior building updates that would provide a more efficient, productive, and comfortable environment for students and staff, CPSC turned to Johnson Controls. Improvements totaling \$4.7 million included the installation of LED lighting, building control optimization, and a new energy



dashboard monitor, among other upgrades. These upgrades were enabled by an energy performance contract, allowing the district to utilize the guaranteed savings realized through the energy and building efficiency updates to offset the cost of the projects. With final project components completed in March 2019, CPSC can make an immediate, positive impact on their environment and bottom line. Implementing energy-efficient and connected building systems ensures that the district will continue on a successful path far into the future. ●●●



LIBERTY UNIVERSITY

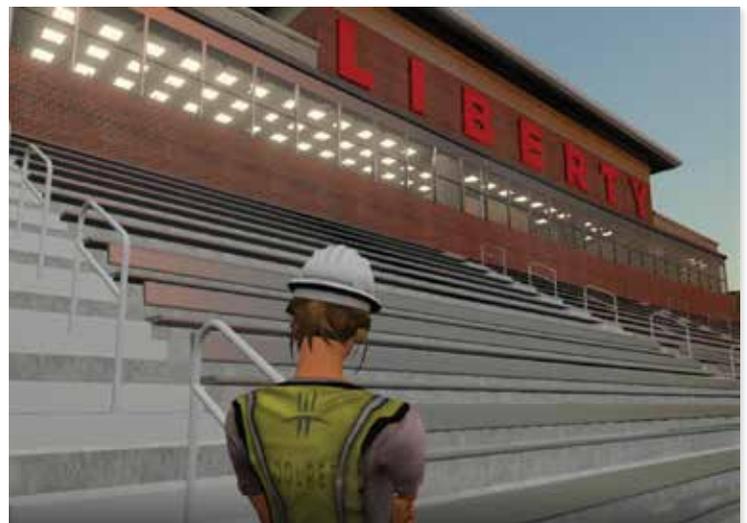
Lynchburg, Virginia

Submitted by Andrew Pack, Vice President, Athletics and Education Practice Leader, Woolpert
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USING GAMING SOFTWARE FOR STADIUM RENOVATION

Woolpert used gaming software to create visualizations to help the client better understand the firm's 2017 renovation of Liberty University's Williams Stadium. The software allowed stakeholders to experience design options, make informed decisions, and reach a consensus on the proposed \$32 million project. The visualizations provided a sense of realistically moving through the finished space by enabling the client to judge the widths of the concourse and plazas. Architects for the project said they used three types of software to illustrate how design changes impacted sightlines and circulation, two crucial aspects of stadium design. Lumion provided fast and intuitive anima-

tions as well as 360-degree panoramas, which could be easily sent to the client. Fuzor created an avatar to walk through spaces and visualize what it would be like to sit in any seat. Revizto allowed the client to click on a drawing or detail for a 3D view. Because the software resembled a video game, the design process was accessible to the client and contractors. The format also allowed collaboration through the Internet in real time, enabling the client to virtually walk with engineers and the construction manager through the building rendering. ●●●



Northwestern

UNIVERSITY LIBRARIES

NORTHWESTERN UNIVERSITY

Evanston, Illinois

Submitted by James Abbott, Facilities Manager,
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TECHNOLOGY PROTECTS THE UNIVERSITY'S COLLECTIONS

Hygrothermographs and data loggers have long been used in libraries, museums, and elsewhere to monitor temperature and humidity levels in archival storage environments. More recently, sensors that connect to building WiFi networks have been introduced to the market. Along with the capability of storing data for staff to review, these new sensors can be accessed by computer or smartphone 24/7, and they offer notification services when user-defined ranges are exceeded. At Northwestern University Libraries, with help from our IT department, temperature and humidity sensors were recently purchased, configured, and installed in collections storage spaces to help with maintaining our more critical areas where rare books and other one-of-a-kind



items are housed. Multiple employees have been given access, and in a few cases, notifications have been delivered when temperatures crept up a bit in certain spaces. The related software allows for a high level of customization for our particular requirements. When a notification goes out, connected staff receive text messages and/or emails. Upon receiving a notification, fast communication with our campus facilities units ensures that prompt attention is given to HVAC or other issues. ●●●●



PENNSYLVANIA STATE UNIVERSITY

University Park, Pennsylvania

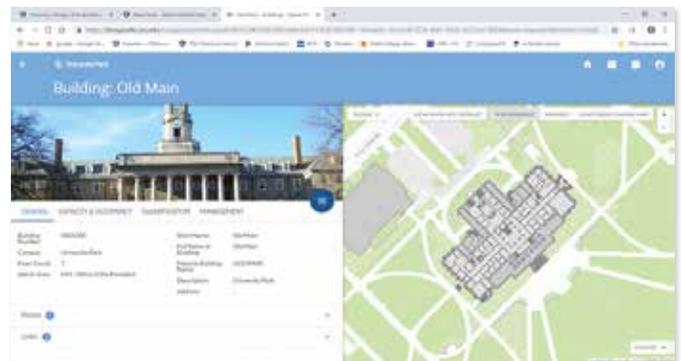
Submitted by Pamela Garbini, CEFP, LEED-AP, Assistant Director Space Management, Penn State (pwg3@psu.edu); and Richard Koochagian, R.A. FMP, COO, PenBay Solutions, LLC (rkoochagian@penbaysolutions.com)

USING TECHNOLOGY TO GET THE MOST OUT OF YOUR EXISTING SPACE

Penn State's Space Planning & Management (SPM) division has the responsibility for planning and managing facility use and needs so that the university can provide the necessary environments for its campus community. To enable both a better understanding and more effective utilization of the university's 90,000-plus academic spaces across its 24 campuses, SPM decided to implement a scalable enterprise system that would support the sustainment and sharing of accurate facilities data. Branding the platform LionSpaceFIS, SPM implemented PenBay Solutions' InVision enterprise software to serve as the system of record for all university spaces. An intuitive web-based application, Lion-

SpaceFIS allows staff to easily update, analyze, and report on space data, as well as access floorplan, building, occupant, and ADA information. With 300-plus active users, university facility coordinators use the system to maintain the official space inventory within their respective administrative unit, which is then used to track key performance metrics and feed roll-up reports for management review, planning, and decision-making.

Processes and reporting that used to take months and could not guarantee accurate information can now be performed on demand and provide reliable data from which to efficiently manage existing space as well as support capital planning efforts. ●●●●





STONY BROOK UNIVERSITY

Stony Brook, New York

Submitted by Joan Behan-Duncan, University Media Relations Coordinator
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STONY BROOK LAUNCHES NEW INSTITUTE FOR ARTIFICIAL INTELLIGENCE DISCOVERY

In May, Stony Brook University officially launched the new Institute for AI-Driven Discovery and Innovation to advance AI research and apply the transformative power of innovation driven by AI across disciplines. The AI Institute will focus on four grand challenges: healthcare, infrastructure, education, and finance. It will also focus on five foundational research areas: automated and scalable knowledge acquisition, predictive intelligence, explainable AI, trustworthy AI, and ethical AI. The



institute will support efforts centered on the overarching vision of human-machine symbiosis, based on the idea that AI technology should amplify human intelligence instead of replacing it. In this way, it will serve as an intellectual hub to coordinate and encourage faculty AI research and educational initiatives across the university and beyond. “The goal of this initiative is to foster innovative collaboration across departments and verticals to bring together teams of students who are early in their educational journey—from engineering, humanities, and a wide range of other disciplines—to tackle important and challenging projects that will have real societal impact through technology and entrepreneurship,” said Samuel L. Stanley Jr., president of Stony Brook University. ●●●

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UNIVERSITY OF GEORGIA

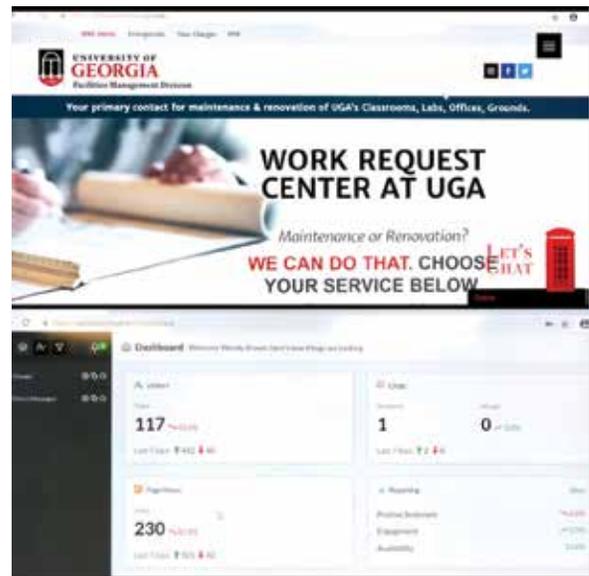
Athens, Georgia

Submitted by Daltavion Almond, Work Management Specialist (daltavion.almond@uga.edu); Wendy Brown, Work Management Specialist (wendy.brown@uga.edu); and Kimberly Thomas, Director of Facilities Management (kjohnson@uga.edu)

TAWK CHAT FEATURE FOR IMPROVED WORK CONTROL

Tawk (www.tawk.to) is an online chat feature used in the Work Request Center at the University of Georgia (UGA). The chat feature is used to free up communication lines so the maintenance dispatchers have more time to respond to calls with more urgency. We went live with this feature on September 3, 2018 and have had 172 calls. Two customer service representatives monitor the chat line during normal business hours, and the average time spent on chats is four minutes. The customer service representatives can monitor and track a customer's navigation of the site, which results in quicker response times. It also saves a transcript of the interactions between the customer and

staff member to be used later for analysis purposes. It offers the ability to add notes to chat tickets that prompt staff members to know when an issue has been resolved, helping to avoid duplication of work. There are both free and paid versions of this feature; however, our targeted goals with the online chat system can be met using the free version. Since implementing this feature, Housing Work Control at UGA has reached out to us inquiring about executing their own unique chat system. ●●●●



HARNESS THE POWER OF IOT TO ENHANCE LEARNING FOR LEADERS OF TOMORROW

Submitted by Gloria Rose, Director, Enterprise & Channel Partnership Sales, Tapdn
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Connected devices have changed the way we live, work, and learn. The ever-evolving tech landscape has created a barrier-free, connected world, simplifying our day-to-day lives in ways we couldn't have imagined just a decade ago. In fact, new technologies have emerged that use sensors to provide unbiased data to help facilities managers understand their current space and asset needs on campus.

With these advancements, they can make informed decisions based on objective data regarding their furniture and real estate, enabling professors and students to get the most out of their learning environment. Investing in IoT (Internet of Things) platforms that use minimal-footprint wireless sensors helps acquire and analyze real-time data—including space utilization, utility, and asset usage.

Students, by using an app, can see availability of study rooms and meeting spaces and book them in real time. New technologies provide hard data on which spaces and assets are being utilized and how. To optimize operations, colleges and

universities now have the ability to make confident, data-based decisions on how to allocate key resources. ●●●●





UNIVERSITY OF MIAMI

Coral Gables, Florida

Submitted by Eli Stephan, Associate Director, Facilities & Operations; Dennys Bayona, Manager, Facilities & Operations; Ana Quintana, Senior Business Systems Analyst; and Joseph Westwright, Business Systems Analyst (jwestwright@miami.edu)

CONNECTING TEAMS WITH MICROSOFT TEAMS

The Facilities & Operations department at the University of Miami is guided by four service standards: Safety, Caring, Responsiveness, and Professionalism. Recognizing that communication is critical to each of these standards, Facilities & Operations recently began to review its existing communications protocols. In partnership with the Business Systems team, the department identified the greatest areas of opportunity and decided to implement the Microsoft Teams communication platform to realize those opportunities. Within a one-year period, Teams was rolled out to over 150 employees in facilities



across the university. On a day-to-day basis, each individual maintenance team from general building mechanics to fire technicians communicate with one another, their managers, and the Facilities Work Control center quickly, discretely, and effectively. In addition to daily use, the platform has been integrated into the university's hurricane response plans and has been deployed during multiple large-scale building exercises. With a 24/7, 365-day-a-year staffed operation, it is critical to have a reliable platform that allows facilities to better serve the university community in a timely, fruitful manner. Microsoft Teams has made our teams nimbler and more interconnected with one another and has allowed the operation to not simply strive for service excellence but define it. ●●●



THE UNIVERSITY OF
NEW MEXICO

UNIVERSITY OF NEW MEXICO

Albuquerque, New Mexico

Submitted by Donald Swick, Facilities Engineer (dswick@unm.edu); and Steve Howe, Public Information Representative (showe@unm.edu)

SUSTAINABLE MAKEOVER OF FARRIS ENGINEERING CENTER

Housed in the 50-year-old Farris Engineering Center, the School of Engineering at the University of New Mexico (UNM) faced a steep challenge in keeping up with aggressive sustainability goals and competing for advanced research grants. The aging facility lacked adequate classroom space and had an inefficient HVAC system unable to maintain consistent temperatures and air quality in offices and laboratories. During the 18-month renovation project, UNM Facilities Management engineers worked closely with designers to incorporate the latest technologies in lighting and HVAC systems. Utilization of electrochromatic window glazing helped reduce the need for interior lighting, which,

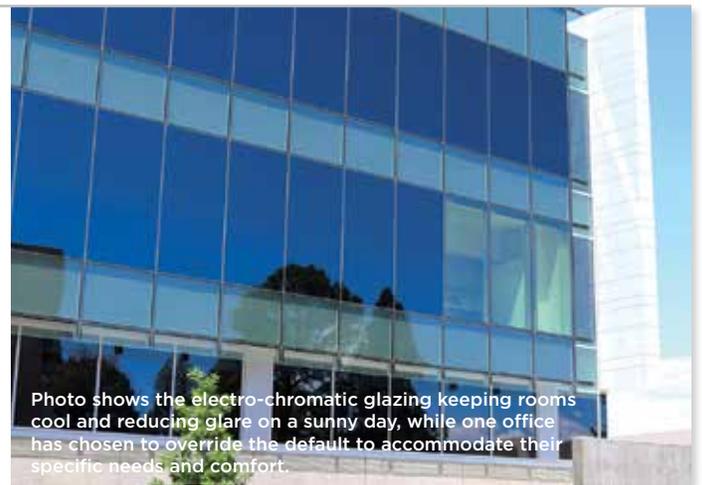


Photo shows the electro-chromatic glazing keeping rooms cool and reducing glare on a sunny day, while one office has chosen to override the default to accommodate their specific needs and comfort.

Photo by Steve Howe

when combined with LED fixtures with wireless occupancy monitors, significantly reduced electricity usage. The enhanced HVAC system utilizes demand control ventilation, a dedicated outdoor air system, and a high-efficiency steam heat exchanger, all leading to improved air quality and thermal comfort throughout.

The project has become a benchmark for campus sustainability efforts and has provided an improved work environment for students, faculty, and researchers. The use of the latest technologies helped achieve a 70% reduction in electricity usage and an overall energy cost savings of 32% in the first year, earning the Farris Engineering Center a Leadership in Energy and Environmental Design (LEED) Gold rating. ●●●



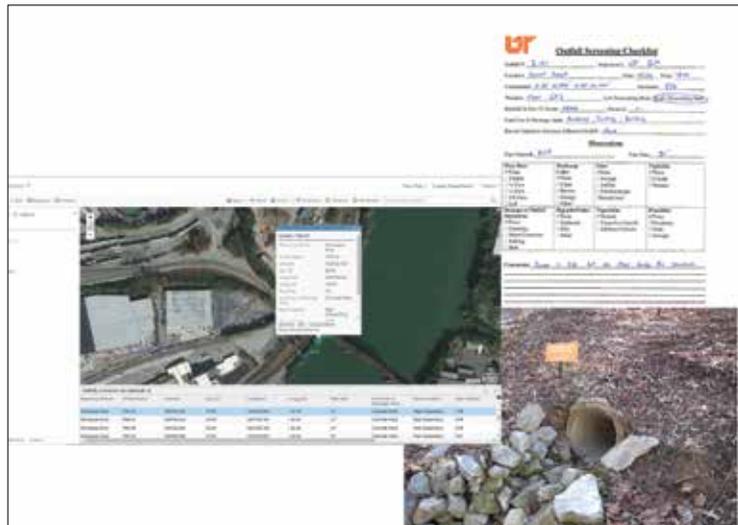
UNIVERSITY OF TENNESSEE KNOXVILLE

Knoxville, Tennessee

Submitted by Maria I. Martinez, GIS Coordinator
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IMPROVING THE FIELD DATA COLLECTION PROCESS USING COLLECTOR FOR ARCGIS

The University of Tennessee Knoxville (UTK) Stormwater staff completes a biannual visual inventory of 88 outfalls that discharge into four waterbodies that surround the campus. This inventory is required in order to comply with our small municipal separate storm sewer system (MS4) permit as mandated by the Tennessee Department of Environment and Conservation. During the inventory, staff collects information about conditions at the outfall, such as damage, odor, deposits, blockage, or flow. UTK is using ArcGIS and Collector for ArcGIS to streamline this task in the field by removing the manual process of collecting field data on paper forms that must be returned to the office and then translated into other formats. A map for the project



was first created using ArcGIS, which included a form designed to complete the outfall screening checklist by stormwater staff in the field. This map was then loaded into our ArcGIS Online administrative account, which allows the information to be accessed in the field using smart devices. This process increases accuracy, helps eliminate recording errors, and reduces the time needed to collect the information, while increasing the speed at which that information can be put to work. ●●●



UNIVERSITY OF TENNESSEE KNOXVILLE

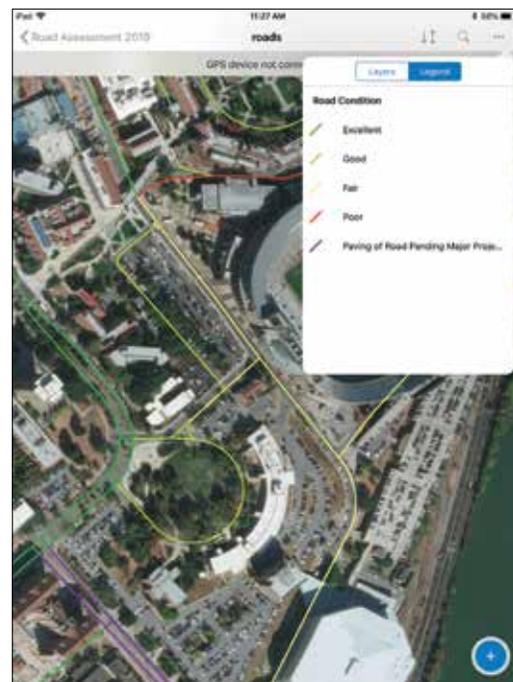
Knoxville, Tennessee

Submitted by Maria I. Martinez, GIS Coordinator
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ASSESSING CAMPUS ROADS USING COLLECTOR FOR ARCGIS

The UTK campus is located on the outskirts of downtown Knoxville, bounded by city-owned properties. The 15 miles of roads running through campus, however, are owned by the university. Traffic on campus is continuously increasing due to the rising number of students attending UTK as well as the large number of athletic and cultural events that occur on campus weekly. Increased traffic has an impact on road conditions; during the last three years, the university has been assessing the surface conditions of roads to establish a program for road maintenance and paving. Facilities Services staff is using Collector for ArcGIS to facilitate this process in the field. Criteria ranging

from excellent to poor is assigned to each segment of pavement on campus. We use factors such as the existence of potholes, patching, or cracks to determine the condition of each segment of road. Information is loaded into an ArcGIS map before field collection; this map is accessible through mobile devices using the Collector for ArcGIS map. Data is collected in real time, processed, and sent to the university administration in a timely manner. This technology makes the data collection and decision-making process faster and more effective. ●●●



W UNIVERSITY of WASHINGTON

UNIVERSITY OF WASHINGTON

Submitted by Aaron Chevront, MAPS Systems Manager, University of Washington (aaronch@uw.edu); and Richard Koochagian, R.A. FMP, COO, PenBay Solutions, LLC (rkoochagian@penbaysolutions.com).

USING TECHNOLOGY TO AUTOMATE EMERGENCY EVACUATION MAP PRODUCTION

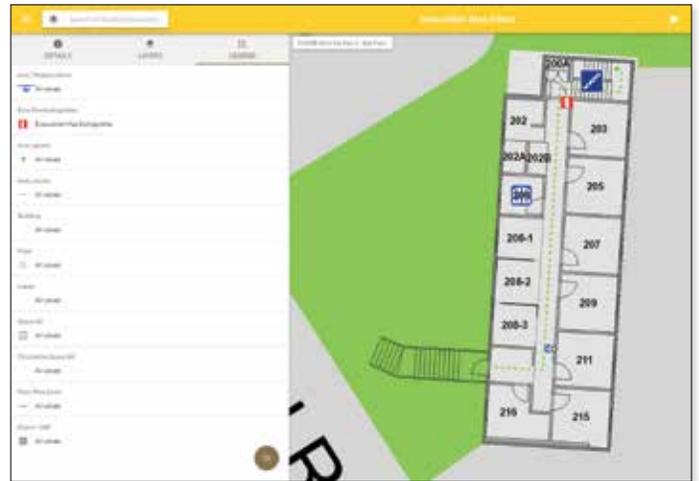
Emergency Evacuation Maps are critical to the safety of building occupants but also expensive to produce and difficult to maintain. When the existing evacuation map processes became too inefficient and costly, the University of Washington (UW) Environmental Health & Safety office contacted the UW Facilities GIS team to see if their indoor mapping system could help create a new map standard and reduce the cost.

The GIS team was able to leverage their InVision enterprise software platform from PenBay Solutions Inc. to collect, manage, and print the authoritative evacuation map contents, indoors and out. By collaborating through this singular system,

associated data owners from across campus need only curate their map content, which minimizes redundant effort and increases data accuracy.

To gain further efficiencies, the GIS team configured a custom print tool that enables the printed maps to be correctly oriented relative to the wall they are hung on. Users with proper permissions can reprint one or all maps for a building from live data with a click of a button for placement in their respective wall frames.

This simple yet effective innovation has eliminated manual and time-consuming evacuation map publishing processes, reduced cost, and increased timeliness and data accuracy. ●●●



Steve Glazner is APPA's director of knowledge management and editor of *Facilities Manager*; he can be reached at steve@appa.org. Many thanks to the schools and business partners who submitted case studies for this feature.



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