An introductory guide to Electronic Facility Records

Leveraging building systems data to do more with less at your school district.





Introduction

This guide is intended to educate facility directors and managers about the concept, benefits, and practical applications of Electronic Facility Records (EFR) to school districts.

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As the 2020s unfold, school district facility managers can expect to be overseeing additional building maintenance tasks with the same or reduced staff and/or budgets.

From pandemic-related cleaning and disinfecting procedures to required building systems upgrades, there has never been a time when real-time, accurate facility data could be of greater use.

Currently most districts face a number of significant challenges when it comes to timely access of accurate facilities data:

- There is no single secure source for district building floor plans that staff and contractors can quickly access.
- Building systems drawings and related construction documentation, including those related to capital project closeouts, are spread throughout the district in hard copy and electronic formats.
- Preventative Maintenance procedures that are vital to extend the usability of building systems are neither adequately documented nor implemented in a timely and consistent manner.
- Important O&M manuals, product data sheets, and other building systems information is similarly inaccessible.
- Important facilities data resides in the heads of long-term staff making it susceptible to loss due to retirement and attrition.
- Hardcopy drawings stored in unsecured storage areas are subject to damage by flooding or other accidents.

With district maintenance staff expected to do more with less, implementing Electronic Facility Records (EFR) is an important way to measurably improve the operations of your school buildings.

IN THIS GUIDE, YOU WILL LEARN:

- The basic components of EFR including data types.
- How EFR organizes asset data by systems and subsystems.
- The important role of EFR Management Systems.
- EFR in action during AMEP and IT service calls.
- Practical applications for school districts including use cases.
- Steps to implement an EFR system at your district.

ELECTRONIC FACILITY RECORDS: CONCEPTS

Electronic Facility Records are the building blocks of accurate facility data.

Electronic Facility Records (EFR) capture data throughout each phase of a building's life to improve strategic decision making and operating efficiencies.



You are probably familiar with Electronic Medical Records (EMR) (upper right) which capture health-related data throughout a patient's lifetime to improve decision-making by doctors and specialists. Collecting EMR data from birth through childhood improves quality-of-life outcomes when the patient reaches adulthood.

Electronic Facility Records (EFR) (middle right) applies the same concept to each phase of a building's lifespan. Data captured during the Plan, Design and Build stages has value to facility managers and support staff in the Manage phase to improve decision making and daily operations.

Data types

EFR can accommodate two primary types of data:

- **Discrete data** (i.e. alpha-numeric characters) that can be entered in a spreadsheet or database such as text, model and serial numbers, costs, warranty expiration dates, etc.
- **Graphical data** representations such as floor plans, systems drawings, and photographs.

Used together, both types of data can improve strategic decision making and facility operations via people and technology.

Examples of discrete (left) and graphical (right) data.

- Asset name
- Location
- Make (manufacturer)
- Model
- Serial No.
- Manufacturing Date
- Installation Date
- Warranty Expiration Date
- Net Weight
- Dimensions
- Specifications
- Preventative Maintenance schedule dates
- Common replacement parts
- Initial cost and depreciation





EFR applies the concept of Electronic Medical Records to buildings.



The ability to access both discrete and graphic data enhances decision making and operations.



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Organized by system and subsystem, Calme facility assets are a primary focus of EFR given the ability to use accurate data to improve systems uptime and long-term capital planning.

EFR captures asset data organized by systems and subsystems.

Assets

The physical assets—equipment, components and parts—that make up facility subsystems are at the core of the EFR concept. Data resident in an EFR becomes actionable when applied to an asset through improved procedures performed by staff/contractors and software-based automation (e.g, building controls).

ELECTRONIC FACILITY RECORDS: CONCEPTS

Data organization

Like assets, Electronic Facility Records are organized by major building systems and sub-systems including:

Architectural, Mechanical, Electrical, Plumbing (AMEP), and;

Technology (infrastructure, networks, communications, etc.).

Below are asset types organized by systems and subsystems.

System	Subsystem	Asset Type examples
Architectural	Conveying Systems	Elevators, Platform/Stage Lifts
	Roofing	Roof, Roof Access, Roof Drains
	Structure	Handicap Ramps, Rooms/Spaces
Electrical	Generation	Generators, Transfer Switches
	Lighting	Emergency Lighting, Lighting
	Power	Electric Breaker Panels, Electric Disconnects, Electric Meters
Furniture,	Fire Suppression	Fire Extinguishers, Fire Hydrants
Fixtures and Equipment	Food Service Equipment	Burners, Coolers, Hoods, Ice Machines, Fryers, Grinders, Ovens, Proofing Cabinets, Refrigerators, Stoves, Wa
	Safety Equipment	AEDs, First Aid Stations
Mechanical	Control Systems	Temperature Sensors
	Heating and Cooling	Air Conditioners, Boilers, Chillers, Condensing Units, Roof Top Units, Expansion Tanks, HVAC Pumps and M
	Ventilation	Air Handling Units, Exhaust Fans, Makeup Air Units, Fan Motors
Plumbing	Fixtures	Drinking Fountains, Ceiling Spray Hose Reels, Hose Bibs
	Gas and Vacuum	Air Compressors, Air Dryers, Gas Meters
	Specialty Plumbing	Fire Department Connections (FDC), Water Softeners, Sump Pumps, Pool Equipment, Grease Traps
	Supply	Backflow Preventers, Potable Tanks, Water Heater (domestic)
Technology	Cabling	Data Cables, Fiber, Fiber Patch Panels, Network Equipment Racks, Service Provider Hardware
	Data Communications	Chromebooks, Copiers, Desktops (PC), Laptops, Tablets, Routers, Servers, Wireless Access Points, Network
	Distributed AV	PA Head Ends, Synchronized Clock and Controls, Digital Signage, PA Speaker/Call Switches
	Integrated AV	Broadcast and Document Cameras, Interactive Displays, Projection Screens, Projectors, Smartboards, Televis
	Safety and Security	Access Control, Blue Lights and Phones, Card Readers, Door Contacts, Lockdown Buttons, Security Video C
Transportation	Grounds Equipment	Lawn Mowers, Plows, Salters, Tractors, Weed Whackers
and Grounds	Vehicle Maintenance Equipment	Vehicle Lift, Tire Balancer, Tool Carts, Welders

There are many other Asset Types available that can be documented in an Electronic Facility Record.

ater Coolers				
Motors, Furnaces,				
and Fiber Quitabas				
and Fiber Switches				

ions

ameras

THE ASSET **INFORMATION EXCHANGE** (AIEX) STANDARD

To facilitate the accurate exchange of facility data between software applications, a data standard is often used so that data fields from one program map correctly to another where the data will be acted upon.

An Asset Information Exchange (AIEX) standard includes both general and asset-specific data such as:

- Asset Type
- Make (Manufacturer)
- Model
- Serial No.
- Dimensions
- Weight
- Specifications based on Asset Type
- Installation Date
- Warranty Start and End Dates
- Required Preventative Maintenance procedures
- Replacement Parts needed
- Replacement Parts onhand inventory



The AIEX captures data that is often handwritten or appears on labels.

ELECTRONIC FACILITY RECORDS: CONCEPTS

An EFR Management System puts it all together securely and accessible.

An Electronic Facility Records Management System (EFRMS) is the source of truth for all of a district's facility data including drawings, specifications, and other information.





The most accurate Electronic Facility Records have little value until they are organized, cataloged, and stored in a secure system that can be accessed by select staff and contractors 24/7.

An EFR Management System (EFRMS) acts as the central repository for all facilities data within an organization that exists in electronic or hardcopy formats and is currently scattered in various locations. These existing data sources include:

- Floor plans and systems drawings (hardcopy, PDFs, CAD)
- Closeout documentation from capital construction projects.
- AMEP and Technology systems specifications.
- O&M manuals and product/material data sheets.
- Preventative Maintenance schedules, records, and logs.

An EFRMS centralizes these and other valuable facilities data sources in a secure cloud-based storage vault for access by authorized users when and where needed.

EFRMS features

An EFRMS—the central repository for all facility systems data within an organization—should ideally be:

- Secure both for uploading and accessing data.
- Cloud-based to eliminate potential damage to physical documents and to make data accessible 24/7.
- Device and operating system independent for access via any web-connected device.
- Searchable with keywords, metatags, and other descriptive fields that facilitate data retrieval.
- Organized by electronic binders and tabs to increase usage adoption rates by mimicking current cataloging methodologies.
- Able to integrate with various software applications to leverage facility data across the enterprise.

An EFRMS is the "source of truth" for all of a district's facility drawings and information. It is also the place to store related asset records, warranties, manuals and documentation.

Having an EFR system in place is an important concept for Next Generation Facility Managers who have the management and technology skills necessary to run the school buildings of the future.

EFRMS benefits

An EFR Management System makes it easy for both people and technology systems to retrieve information about buildings and act on that data accordingly. Major benefits of an EFRMS include: Improve building systems uptime and reduce service call durations and costs. Automate work order, preventative maintenance and asset management procedures and processes.

- Maximize warranty contracts.

- Improve capital project planning and execution with construction project administration and management programs.

These and other benefits are further described in this document.



All EFR data is stored based on the Asset Information Exchange (AIEX) standard.

Reduce liability risks by ensuring all required inspections are completed in a timely accurate manner. Facilitate capital planning with predictive forecasting of replacement and depreciation costs on assets.

Reducing the cost and duration of service calls while increasing system uptime is an important EFR application with a rapid Return On Investment.



ELECTRONIC FACILITY RECORDS: PRACTICAL APPLICATIONS

Find the facility data you need in 30 seconds or less.

Application 1: Equipment Service Calls using an EFRMS

AMEP Building Systems

- 1. An electronic Work Order is received by district maintenance technician to diagnose an issue with an Air Handling Unit (AHU) at a specific school building
- 2. The technician accesses EFR data about the AHU to check its exact location. make and model, and common replacement parts before leaving the office.
- 3. The common parts are picked up from inventory and the technician proceeds to the school building (with a tablet in their toolkit).
- 4. On the roof at the AHU, the technician takes a photo of a QR code with the tablet to access a schematic drawing of the HVAC system of that building.
- 5. Using the schematics and other EFR data, the technician is able to guickly diagnose and repair the issue using the replacement part picked up at the office.
- 6. The technician updates the electronic work order to a completed status and adds notes and a photo.



Technology Systems

- 1. An electronic IT Support Ticket is received by a district IT technician to diagnose an issue with wireless access in a portion of a specific school building
- 2. The technician accesses EFR data about the wireless network and connected access points to check their locations, make and model, and



common replacement parts before leaving the office.

- 3. The common parts are picked up from inventory and the technician proceeds to the school building (with a tablet in their toolkit).
- 4. In the affected building area, the technician takes a photo of a QR code of the wireless network server to access IP addresses and other related data for related Wireless Access Points.
- 5. Using the schematics and other EFR data, the technician is able to quickly diagnose the problematic WAP, replace and test it.
- 6. The technician updates the Support Ticket to a completed status and adds notes about the new WAP including its serial number and date of installation.

Click, search or snap: Easy ways to access EFR drawings and data











OTHER EFR APPLICATIONS

Real-time monitoring and reporting. Monitor the status of Work Orders, PM procedures, contractor service and more.

Budgeting and Forecasting. Integrate financial and time-based data throughout the district for more accurate forecasting and annual budgeting.

Capital projects. Gather capital project information in one location including Drawings, Submittals, O&M documentation, and Payment applications.

Inventory Management. Manage inventory of key supplies and decrements supply counts as they are being used and noted in the system.



EFR provides the opportunity to automate many routine facility maintenance tasks.

asset QR code

Electronic Facility Records can be used to improve the operation and longterm efficiency of every AMEP and Technology system in every district building.

ELECTRONIC FACILITY RECORDS: PRACTICAL APPLICATIONS

Applications and benefits for school districts

An accurate Electronic Facility Records Management System (EFRMS) brings value to every AMEP and Technology building system in a school district.

While the timely oversight of these facility systems has always been crucial to maintaining healthy buildings, it has become especially important during the current health pandemic.

Below are ten examples of how an EFRMS can be used in school districts to improve operations based on collected and catalogued asset data.

Automate **electrical usage** via building automation software that control lighting.

Maintain **wireless connectivity** with Wireless Access Point data.

Facilitate future capital projects with an accurate **Door Hardware** inventory and product schedule.

Improve upgrade efficiencies with access and rack information for **IT Equipment Rooms.**

Ensure **COVID-19** HVAC filter upgrades are being installed on a timely basis.

Reduce service call durations and expenses with consolidated **Security Systems** device data.

Improve onsite and remote curriculum delivery with an accurate inventory of the **Instructional Technology** devices at your district.

Extend the usable lives of MEP systems with timely **Preventative Maintenance** processes.

 Ret cooking with an accurate picture of your building's kitchen assets.

 Improve plant safety with systems data secured for First Responders.



EFR: PRACTICAL APPLICATIONS

Next steps for your district

Now that you know about the Electronic Facility Records concept, here are a few steps to get started.

1. Harvest existing facilities data.

The best starting point is to inventory existing hard-copy and electronic records for drawings and data at your district. Typically this information is scattered over multiple locations including plan and storerooms, facility manager offices, and on laptops.

2. Add data with site surveys.

Onsite asset data surveys allow facility directors to get specific types of data they need about the systems and subsystems of the highest concern.

3. Add warranty data.

Collecting your building's systems/subsystem warranty information in one accessible, secure location allows for an automatic notification before a Service Level Agreement (SLA) expires. This provides time to either renew the SLA, adjust the terms, or cancel it based on the assets to which it applies.

4. Add Work Orders and PM procedures.

HVAC and other subsystems that benefit from regular Preventative Maintenance are another area of focus for data survey and collection. Asset data can be used for an efficient Work Order system with related PM checklists for service techs.

5. Affix QR codes.

Once an asset record is created, a durable, weather-proof QR code can be placed on the physical asset. The asset data can then be accessed instantly via a smartphone app.

6. Keep data as up-to-date as systems.

The district EFRMS will require regular maintenance to stay current and reflect any replacements, upgrades, or changes made to MEP or Technology systems. The following tasks are usually needed to maintain an accurate EFRMS:

- CAD or Revit drafting to update floor plans with Moves, Changes, and Additions (MACs).
- Work Order system refinement with addition of more assets, QR codes, and Preventative Maintenance data.
- Data entry and/or spreadsheet imports
- Integration of As Built drawings and specs, and other capital project documentation after each design and construction phase.

Select school districts that have benefited from Electronic Facility Records



CLINTON Central School District, NY ß





NORTH TONAWANDA City School District, NY

For more information about the EFR concept as well as software applications that enable adoption at school districts, please visit www.masterlibrary.com.



To learn more about Next Generation Facility Managers, please download the white paper at www.masterlibrary.com/ngfm.html.

