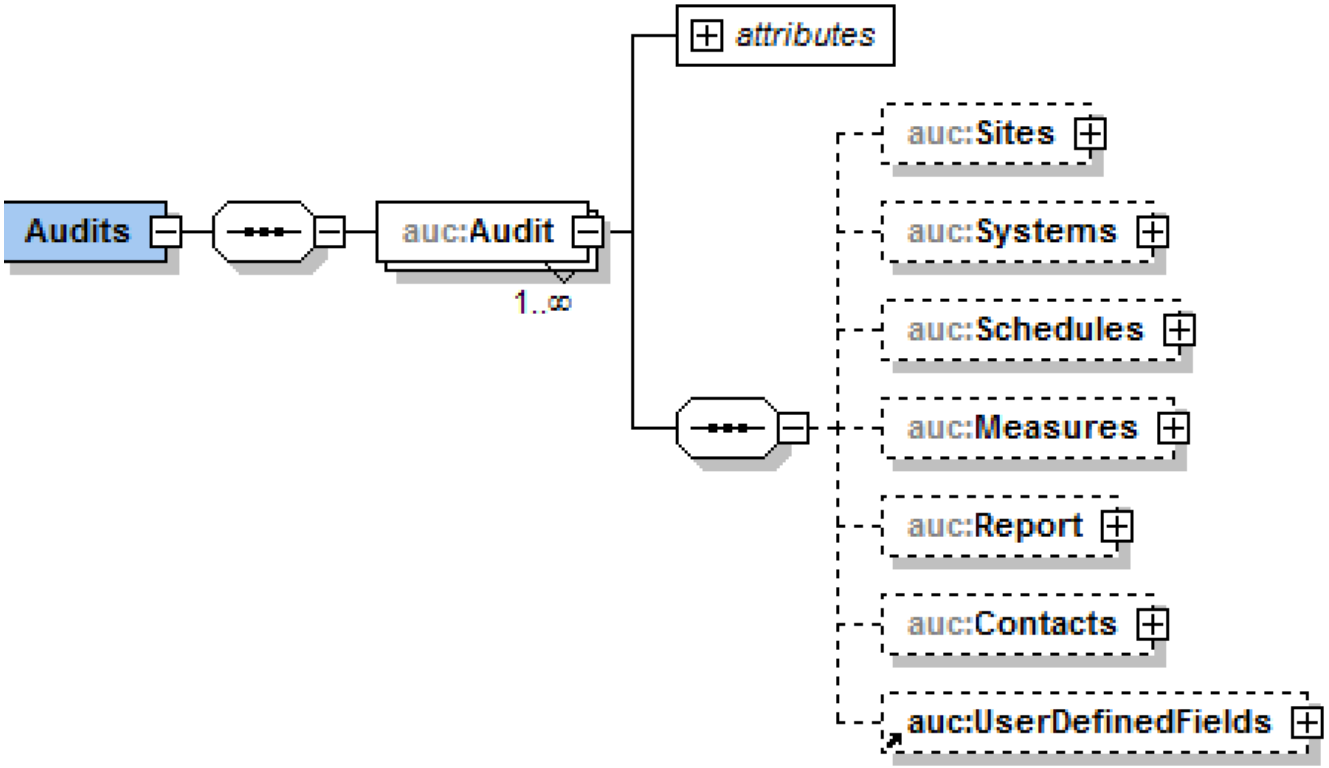
BuildingSync®

2017 Building Technologies Office Peer Review



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Project Summary

Timeline:

Start date: 10/01/2015

Planned end date: 9/30/2018

Key Milestones

1. Launch of working groups for developer and users; 11/03/2016
2. Path for users to easily export BuildingSync format from ASHRAE Standard 211 Forms; 09/29/2017

Budget:

Total Project $ to Date (1/21/2017):

- DOE: $1,085,000
- Cost Share: $0

Total Project $:

- DOE: $270,000
- Cost Share: $0

Key Partners:

PNNL	ASHRAE
FEMP / CTS	PSD Consulting (OEI)
EMAT	FirstFuel
simuwatt	

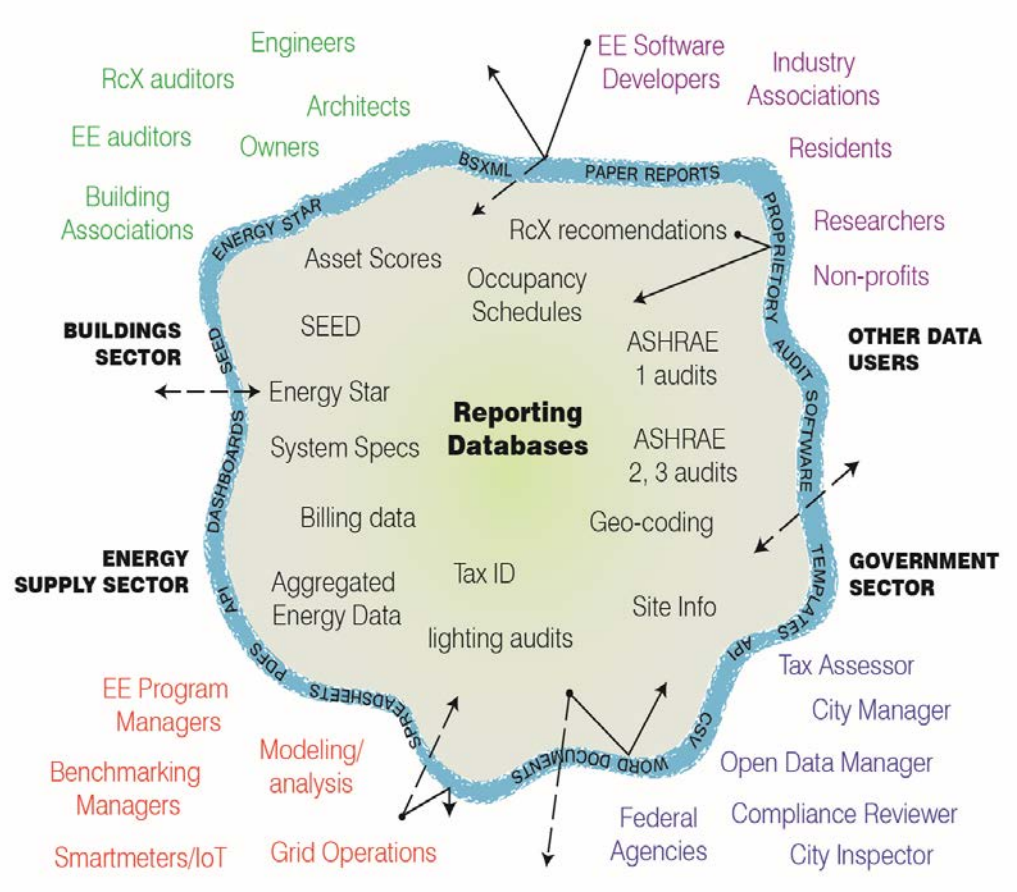
Project Outcome:

Development of an open standard for exchanging building-level information designed to increase interoperability of various tools during the operation and maintenance of commercial buildings.

BuildingSync focuses on describing the building from an auditor's perspective, including a list of potential energy conservation measures and cost savings associated with replacements/upgrades.

Purpose and Objectives

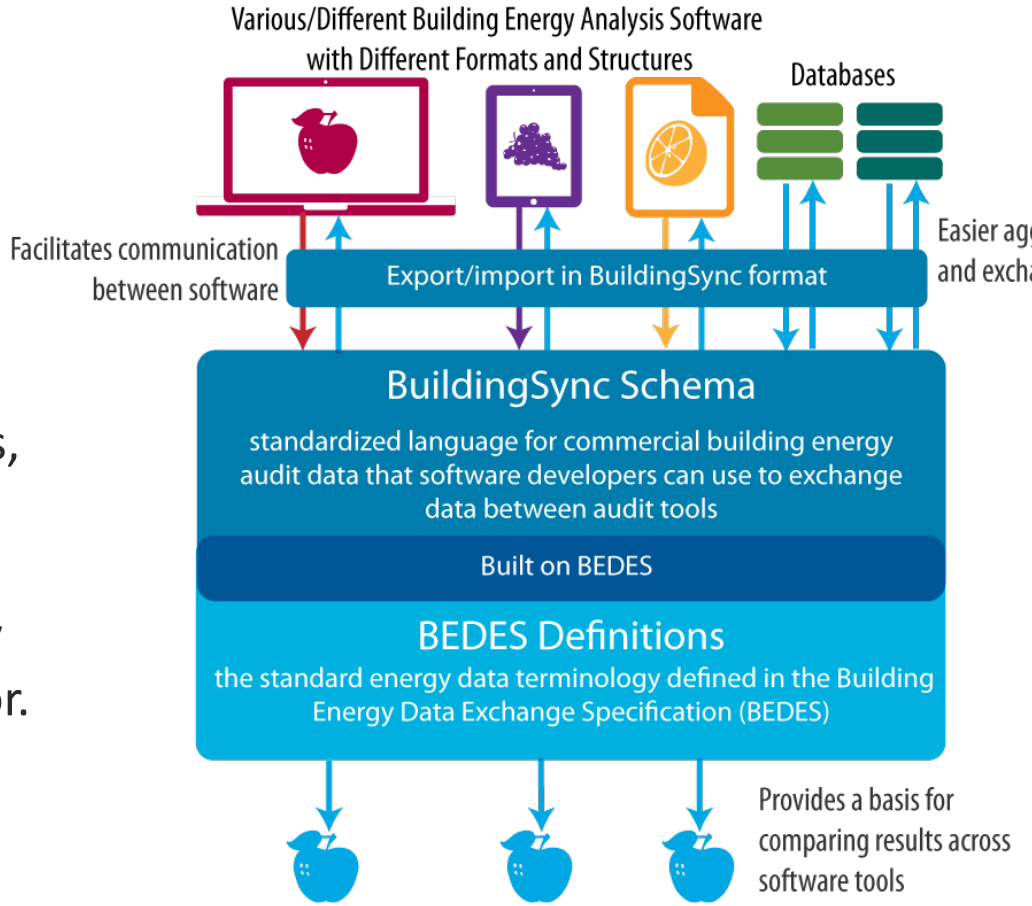
Problem Statement:
There are many consumers of commercial building data, including auditors, engineers, designers, operators, inspectors, researchers, etc. The data are typically provided in *varying formats* with *varying definitions*. This lack of standardization limits the data's usefulness.



Credit: Amanda Lloyd, CBEI

Purpose and Objectives

Target Market and Audience:
Auditing firms, commercial building software firms, cities/jurisdictions, organizations, agencies. Users of ASHRAE's Energy Auditing Standard 211. The goal is to target the majority of the commercial building sector.



Credit: Marjorie Schott, NREL

Impact of Project

General Outcomes:

- *BTO MYPP Strategy 3*: Accelerate adoption of energy saving solutions by developing market infrastructure
- Electronic data exchange schema to facilitate integration of building energy audit data
- A grassroots community using BuildingSync for data exchange
- Ability to reuse existing BuildingSync for repeat audits can save substantial money

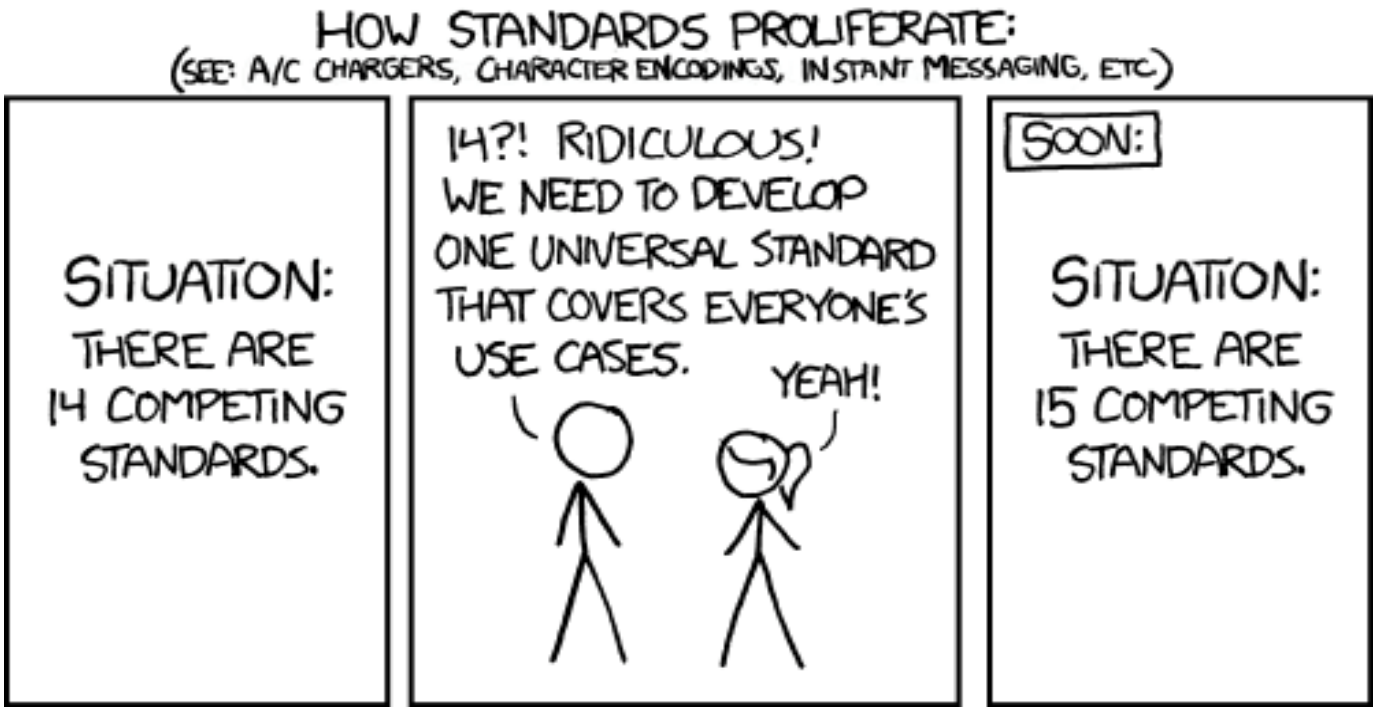
Near-term: Integration of BuildingSync into various DOE analysis platforms. Integration into at least 2 commercial auditing products.

Mid-term: Market uptake in maintaining and updating the standard. DOE participation is still needed to maintain neutral language.

Long-term: Substantial integration of BuildingSync in day-to-day data exchange.

Federal agencies are required to perform energy audits on 25% of their building stock on a four year cycle

Not the Approach



https://xkcd.com/927/

Approach

Development Approach:

- Research and Development
  - Research current standards
  - Delineate BuildingSync from other standards

Table 1 – Summary Comparison of Existing XML Schemas

Consideration	*gbXML*	*CBECC-Com*	*COMNET*	*EDAPT*	*BuildingSync*
An XML schema exists to constrain input	Yes	No	Yes	Yes	Yes
BEDES Compliant	No	No	No	No	Yes
Accommodates energy results at different time steps	Yes	n. a.	Yes	No	Yes
Designed for existing building audits	No	No	No	No	Yes
Robust and flexible	Yes	n. a.	Medium	Low	High
Designed specifically to capture energy modeling results	No	No	Yes	Yes	No
Already implemented in software	Yes	Yes	Yes	Yes	Yes
Contains the level of detail needed for input to an energy simulation model	Yes	Yes (used for CBECC software)	No	No	Yes (but just for DOE Asset Score)

Credit: Charles Eley, 2016

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Energy Conservation Measures (ECMs)

BuildingSync includes list of measures

- List of measures allows for upgrades to be tracked in a consistent manner across software programs
- Enumerations are programmatically accessible.

Boiler Plant Improvements	• Replace boiler • Replace burner • Decentralize boiler • Insulate boiler room • Add energy recovery • Convert gas-fired unit to boiler loop • Convert system from steam to hot water • Clean and/or repair • Implement training and/or documentation


```
{
    "name": "MeasureName",
    "sub_name": "ChilledWaterHotWaterAndSteamDistributionSystems",
    "documentation": "Chilled Water, Hot Water, and Steam Distribution Systems",
    "enumerations": [
        "Add pipe insulation",
        "Repair and/or replace steam traps",
        "Retrofit and replace chiller plant pumping, piping, and controls",
        "Repair or replace existing condensate return systems or install new condensate return
        "Add recirculating pumps",
        "Replace or upgrade water heater",
        "Add energy recovery",
        "Install solar hot water system",
        "Separate DHW from heating",
        "Replace with higher efficiency pump",
        "Replace with variable speed pump",
        "Clean and/or repair",
        "Implement training and/or documentation",
        "Upgrade operating protocols, calibration, and/or sequencing",
        "Other"
    ],
```


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Approach, Issues, and Distinctive Characteristics

Dissemination and Adoption Approach:

- In order to achieve the expected adoption of BuildingSync, the following methods are being deployed:
  - Website (https://buildingsync.net)
  - Developer Working Group (currently 6 companies, 14 members)
  - Users Working Group (currently 8 companies/organizations, 10 members)
  - Close collaboration with PNNL on Asset Score

Key Issues: Developing and achieving adoption of a new standard is challenging. Chicken and egg problem.

Distinctive Characteristics: In order to achieve adoption, we are first adopting the standard internally across various DOE projects to ensure its completeness and success while working with the private sector to prevent ivory tower syndrome.

Progress and Accomplishments

Accomplishments: Over the past year:

- Schema updates including support for multi-tenancy and Asset Score
- Launched 2 working groups
- FEMP Compliance Tracking Software (CTS) integration
- Asset Score and Reporting Platform implementing BuildingSync export
- Website and custom domain launched

Market Impact:

- ASHRAE Energy Auditing Standard 211 specifies BuildingSync as the preferred data exchange format
- ASHRAE's Building Energy Rating Program (bEQ) will use BuildingSync as the receiving data format
- Backend format for data exchange in the Open Energy Initiative Project.

Awards/Recognition: Forthcoming

Lessons Learned:

- Need to ensure clear use cases for new Standards instead of creating one for general use!

Project Integration and Collaboration

Project Integration: The project is managed through Github in order to effectively track proposed changes to the schema in an open manner. There are two working group meetings that occur at least once quarterly.

Partners, Subcontractors, and Collaborators: There are several partners on the project spanning auditing firms (consumers), software developers (authoring), local government, federal government (author/consumer), national labs (PNNL, LBNL), and organizations. Subcontract with Terabuild to assist in writing an OpenStudio to/from BuildingSync translator for building energy information.

Communications: Work has been presented in seminars alongside various projects, including Asset Score, SEED, OEI, and BayREN/BRICR.

Collaborators and Reviewers

Next Steps and Future Plans

Development:

- Currently BuildingSync files are validated against an XML schema, which only flags file structure errors and data type issues.
  - Future plans to develop methods for checking in-range (rule-based) issues, such as air-cooled chillers requiring COPs between 3 and 5.
- Development of Dashboard to report state of the standard including test file compliance.
- SEED support for BuildingSync
- Expansion and alignment of measures into BEDES and other DOE projects

Dissemination and Adoption:

- Developer Competition with honorarium for implementing BuildingSync into workflow.
- BuildingSync use case selector similar to HPXML. Ability to select a use case from an online site and return which fields shall/should be filled out.

REFERENCE SLIDES

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Project Budget

Project Budget: Project received $360,000 in FY13 in the Audit Standard Project, which was mostly forward funding. Project received $180,000 in FY15 in the BuildingSync Project. Project received $275,000 in FY16 into the BuildingSync and SEED Project. Project received $270,000 into the BuildingSync Project.
Variances: None
Cost to Date: $819,401
Additional Funding: None

Budget History					
FY 2013 – FY 2016 (past)		FY 2017 (current)		FY 2018 – FY 2018 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
$815,000	$0	$270,000	$0	$ TBD	$0

Project Plan and Schedule