

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 1 of 22

Funding Opportunity Announcement (FOA), DE-FOA-0001167 - Buildings University Innovators And Leaders Development (BUILD) - 2015 seeks to improve the competitiveness of American universities to conduct building energy efficiency R&D, develop strong industrial partnerships and improve manufacturing education.

**Underlying Premise of Submission**

The *primary energy savings potential* from our submission comes from the impact of having capital markets and financial services collaborate with BEDES to implement interoperability of higher quality financial and operational data to improve access to credit for new construction and retrofit of energy generating facilities and/or the construction of energy efficient buildings.

Universally adopted open energy related data standards and interoperability will enable improved efficiencies throughout the lifecycle of an energy related facility, from small residential to large utility scale.

The resultant efficiency will reduce construction costs and increase productivity, which will correspondingly augment the financial incentive to incorporate energy efficiency.

That positive financial impact, coupled with the ability to quantify the financial impact, will improve access to capital for building energy efficient facilities.

**FOA 0001167 Deliverable - Improved ability to incorporate energy efficiency and access to capital**

Relevant points - American universities to conduct building energy efficiency R&D

Dixon Wright has been working with California State University on the AGC Surety Connection Project at CSU Chico to develop universally adopted open standards in construction in collaboration with Associated General Contractors of American and its California chapter.

XBRL-CET assumed the effort to concentrate the effort on energy related financial reporting aspects utilizing the XBRL taxonomy, particularly given the significant number of utilities, banks and public companies that have already implemented XBRL in compliance with federal regulations.

**FOA 0001167 Deliverable – Interoperability R&D Center established at selected university.**

**Applicability Considerations  
XBRL-CET and BEDES  
Buildings University Innovators And Leaders Development (BUILD) - 2015  
FOA-0001167  
Page 2 of 22**

Relevant points - Develop strong industrial partnerships.

The XBRL-CET working group will bring to BEDES business partnerships with the financial industries, accounting, insurance and surety.

Lead: BEDES  
Partners: XBRL US – Existing XBRL taxonomy  
FASB  
SGIP – NIST, DOE, FERC  
Solar Nexus - IEP XML  
Wells Fargo  
Liberty Mutual  
PwC  
Intuit  
GALLINA  
Others

**FOA 0001167 Deliverable – BEDES working group expanded to include broader stakeholders.**

**Notice of Intent FOA DE-FOA-0001167**

These student teams must include undergraduate students, and be led by faculty with relevant expertise in energy efficient technologies, manufacturing (for projects developing hardware), and commercialization.

Both CSU Chico and LBNL have undergraduate students

We can still continue with the XBRL Challenge contest and seek other universities after the concept paper is due on December 19th and the final proposal due February 11, 2015.

The Lead Institution must be an Institution of Higher Education, which includes, but is not limited to universities, 2-year community colleges, and predominantly undergraduate institutions. The Lead Institution can choose to team with external partners such as a manufacturer or a government laboratory, but an external partner is not required at the time of application.

BEDES and LBNL would be the lead, but we could have an external partnership with CSU Chico.

The group of entities from XBRL-CET would all be external partners.

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 3 of 22

Teams may propose to develop any technology (hardware), software, or manufacturing process with direct application to residential, multi-family and/or commercial buildings in the USA, with significant primary energy savings potential.

We are having students prepare software applications that utilize open freely available international information standards like XBRL, that work on hand report and CALISO report.

**The BUILD FOA will have the following objectives:**

- (i) Improving the competitiveness of American universities to conduct building energy-efficiency R&D  
The Interoperability R&D Facility will accomplish this.
  
- (ii) Enabling American universities to develop stronger partnerships with industry  
The Interoperability R&D Center will be broadly supported by various entities, public and private, with each stakeholder actively engaged. Further, enhancing student awareness of the process implications of information supply chain standardization will have applications in future scenarios facilitating additional collaborations.
  
- (iii) Improving manufacturing education in American universities  
The Interoperability R&D Center will be engaged in building the nation's energy infrastructure, energy efficient buildings and enabling innovation on many fronts. Construction and manufacturing are closely tied and often synonymous.

**Required Concept Paper Submittals**

**Cover Page**

Topic Area Number	: DE-FOA-0001167
Project Title	:
Lead Organization	:
Organization Type	:
Anticipated Project Budget	:
Principal Investigator	:
Team Members and Key Participants	:

Abstract (200 words max)

The SGIP recently accepted Priority Action Plan 25 (PAP25) and scheduled a session for the 2014 Winter Meeting on December 8<sup>th</sup>. PAP25 is an exploration of having SGIP collaborate with XBRL US to extend the freely available public FASB US GAAP taxonomy to include energy related specific data fields, particularly for building the nation's energy infrastructure, streamlining the interconnection process, and improving access to capital from financial markets. The initial energy related set of data fields being incorporated and synergized is IEP XML, a standard already being developed with DOE funding. This will also help to reduce redundancy

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 4 of 22

and align energy sector standardization with other relevant sectors and stakeholders (e.g. banking, construction, technology, etc.).

PAP25 has exactly the same mission statement as BEDES, except BEDES is focused on data element definitions or fields used in quantifying energy related data in existing buildings and PAP25 is focused in data element definitions or fields used by financial markets and project developers for future buildings and generation facilities.

Data standardization enables interoperability across disparate systems and will enable better quality data, investment analysis, significant cost savings and improved access to capital and financial services. The collaboration of BEDES, SGIP and XBRL will advance the establishment of interoperability by connecting, coordinating and synergizing existing standards to complement each other instead of competing.

Coordinated information standards that leverage common definitions and syntax enable various proprietary systems to seamlessly exchange data will reduce costs, improve data quality and analysis and thereby make more projects viable for energy related efficiencies to be implemented.

## **Technology Description**

### **Introduction**

XBRL is a freely available international information standard relevant for expressing business information. Governments around the world have adopted XBRL for business-to-government and government-to-government business information exchange; XBRL is also used by businesses for their own benefit. In the United States, XBRL has been adopted in the banking sector by the Federal Financial Institutions Examination Council (FFIEC) for its Common Data Repository<sup>1</sup> and by the Securities and Exchange Commission for financial statements, mutual fund risk/return summaries and other interactive data regimes<sup>2</sup>. Further, a broad range of business and reporting concepts have been expressed as XBRL Taxonomies including explicit linkages from individual elements to common definitions, labeling options, contextual attributes (e.g. currency, nature, units, etc.) relationships, and in some cases references to authoritative regulations and laws as outlined in Appendix A. These existing taxonomies are used by public and private companies in countries around the world. More relevant to this project, the publicly available FASB US GAAP taxonomy is currently used by all U.S. public companies is being extended to accommodate construction, energy and transportation element definitions specifically relevant to this effort.

---

<sup>1</sup> <https://cdr.ffiec.gov/public/>

<sup>2</sup> <http://xbrl.sec.gov>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 5 of 22

BEDES has an extensive dictionary of terms, and a platform designed to “knit together” a wide range of data standards.

Additionally, as with any market effort, some agreement as to the naming of specific legal entities participating in the supply chain is foundational. The U.S. Treasury is collaborating with other governments and commercial organizations around the world in development of the Legal Entity Identifier<sup>3</sup> (“LEI”)– providing a unique legal entity naming convention. The LEI may also be a unique information standard relevant to this project effort.

Impact of the Proposed Technology/Approach Relative to State-of-the-Art

The current state of the art for interoperability and/or data exchange is poor and constrained relying heavily on either highly proprietary APIs, commercial software middleware applications and/or manual rekeying and copy-and-paste scenarios. Further, enterprises operating in this segment commonly communicate with a very diverse set of organizations, creditors, stakeholders and government agencies often each with their unique applications, forms and data requirements placing a compliance burden that can be reduced by standardized freely available information artifacts enabling all supply chain constituents to literally ‘speak the same language’ regardless of their commercial proprietary software application choices.

The innovation enabled by supply chain standardization includes significantly enhanced interoperability of data exchanges by sector constituents that will greatly advance the development of new systems, tools and resources for manufacturing, construction and financial services while reducing burdens currently associated with highly manual information exchange, reporting, validation, analysis and other processes.

Overall Scientific and Technical Merit

The proposed use of freely available international information standards enabling interoperability among disparate commercial software applications has significant technical and scientific merit as evidenced by the market implementations in the U.S. and other countries around the world. Appendix B: “Examples of Standards Implementations with Scientific and Technical Merit” includes a litany of case study examples where both the technical and scientific merit of the proposed standardization approach has provided process enhancement and transparency benefits to a broad range of supply chain stakeholders including very small creditors borrowing from the Micro-Finance Exchange to the largest public companies and financial services regulators. Clearly, the ability to establish foundational informational standards, to structure information in a common language or syntax provides and freely available resources to all supply chain participants enabling innovation critical to success.

---

<sup>3</sup> <http://www.leiroc.org/>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 6 of 22

## Outline of FOA Objectives

### BUILD Program Metrics

- Invention disclosures submitted to DOE  
The free publicly available FASB US GAAP XBRL taxonomy being extended to include energy related data specific to this project effort would not be an invention subject to IP concerns. Extensions to the US GAAP XBRL taxonomy are common in the market today and are often collaboratively developed by competing market participants and stakeholders. As a result, the open royalty free nature of these taxonomies is commercially and legally assured.
- Licensing agreements  
There are no licensing agreements with XBRL or SGIP.
- Follow-on funding secured (grants, investment, etc.)  
The FASB is an accounting standards body critical to the capital markets and is largely funded by public company fees and subscriptions and publication income. The XBRL International consortium provides freely available information standards to countries and organizations around the world and is a membership organization that is funded by membership dues and conference fees. BEDES is well positioned to establish sustainability.
- Spin-off companies started  
We anticipate a great number of innovations will generated. some as start up companies. There are examples of where XBRL enabled standardization has increased the number of vendor choices as well as enabled new processes and capabilities including:
  - SEC Interactive Data Program - as outlined in the SEC Staff Observations on Custom Tag Rates<sup>4</sup>, the number of vendors supporting company reporting processes has increased to over 34 since the inception of the program.
  - SEC Interactive Data Program - start-up companies enhancing analytical processes and capabilities of SEC registrants structured data is an increasing number of both commercial and open source vendors including: Calcbench, XBRLAnalyst, Arelle, 9WSearch, Sector3, FIOS, XBRLFinAPP, Rivet, XBRLCloud, Thinknum, RankandFiled “SEC Filings for Humans”, and others.
  - New Collaborative Analytical Capabilities have also been realized via the SEC Interactive Data Program - the US GAAP and Document and Entity Information standardized data now available via RSS Feed enables development of analytical applications using standardized rules creating collaborative or social analytical

---

<sup>4</sup> <http://www.sec.gov/dera/reportspubs/assessment-custom-tag-rates-xbrl.html>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 7 of 22

processes wherein analysts can reuse/share/collaborate on analytical models. Vendor examples with this new collaborative or social analytical capability includes: EDGAR-Online's I-Matrix, Calcbench, XBRLAnalyst, Arelle, and others.

- **Products commercialized, including cost and performance information**  
Financial Performance Measurement has a number of potential applications enabled by interoperability. As noted in the answer to the question above, the SEC's Interactive Data Program using XBRL and LEI standards has resulted in a broad range of new companies, new products and new capabilities.
- **Improved manufacturing processes implemented by a company**  
Financial Performance Measurement will result in a number of adaptations during the design process, through construction and ultimately to long term maintenance of buildings and energy related facilities.
- **Number of undergraduate & graduate students participating in the program**  
There should be significant opportunities at the outset of the project, and be sustained as the Interoperability R&D Facility is established. Further, the collaborative analytical capabilities enabled through the use of standardized data and standardized rules creates a more effective method for students and supply chain stakeholders to cost effectively access data and share their analytical intellectual property across a broad range of commercial vendor software applications. Unlike existing software centric data stores and analytical models that are hard wired within proprietary analytical applications, standardized data and standardized rules enables data and rules/models to be shared and collaborated on by students across their disparate proprietary analytical applications or platforms.
- **Building energy efficiency and/or manufacturing education improvements, such as increased enrollment in relevant courses, new courses, and student participation in professional development classes**  
CSU Chico already has an extensive Construction Management Degree program that engages students in emerging technology related to construction, and has an MIS degree option as well. This project, if done with CSU Chico will enhance those programs. This project is also presents an initial foray for students into the 'semantic web' and like the initial steps into the 'Internet' in the late 1990's presents a broad range of challenges and opportunities for students to investigate, explore and exploit.
- **Number of student participants employed in building energy efficiency or related manufacturing within 1 year of graduation**  
We anticipate a 100% hire rate given the need for talent qualified to help public entities and private construction companies meet the demand of new processes

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 8 of 22

and the increasing demand for more relevant, frequent and accurate data for a broad range of stakeholder requirements.

- Number of student participants employed in building energy efficiency or related manufacturing within 5 years of graduation (voluntary)  
We anticipate a 100% retention rate given the need will be increasing, and the challenges will be rewarding to those that can best exploit the potential.
- Technical potential primary energy savings for commercialized technologies or approaches developed in part through this program  
The energy savings will be measured in the number of new and retrofitted buildings that were able to take advantage of the capability enabled by interoperability, either directly or indirectly, including access to capital and financial services.

Further, this project demonstrates how different commercial vendors speaking the same language can collaborate on freely available open market standards to create mutual benefits as well as benefits for all stakeholders. While this is a business information supply chain standardization project, it provides a useful example for how and why technical energy information exchanges among commercial energy equipment vendors can likewise produce mutual and market benefits.

## **Other Requirements**

### **Institutional requirements**

- Lead institution must be an Institution of Higher Education:
  - Universities, 2-year community colleges, predominately undergraduate institutions, etc.  
CSU Chico, LBNL, or any other university selected as part of the XBRL-CET Challenge will qualify.
- Faculty or other PIs/Co-PIs with relevant expertise in energy efficiency, manufacturing (for projects developing hardware), and commercialization  
CSU Chico, LBNL, or any other university selected as part of the XBRL-CET Challenge will qualify.
- Minimum of 50% of the project direct costs to be used to support undergraduate students (salaries, stipends, materials & supplies, equipment, travel, etc.)  
The budget will be for \$250,000, with \$50,000 raised by XBRL-CET and \$200,000 from the research grant.

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 9 of 22

All 250,000 will be available to LBNL or a split with CSU Chico and/or other universities selected.

No funds will be directed outside the academic community.

**Teaming With an Industrial Partner**

- Although not required at the beginning of a project, by the end of Year 1 each project must include an external industrial partner
  - Industrial partner must enhance the university team's capabilities to bring their technology to market

The list of industrial partners previously cited will more than qualify.
  - Manufacturers, national labs, utilities, non-profits, etc. are allowed

The XBRL-CET Challenge selected university will, if that direction is determined, team with LBNL and BEDES.

**Applicable Technology Readiness Level (TRL)**

- Proposed technologies or approaches can be any TRL short of a commercialized technology ( $TRL \leq 8$ )

The FASB US GAAP XBRL taxonomy is ready and implemented for public company financial reporting to the SEC. Extending it is not a technological problem rather a collaboration to add elements unique to this CET project effort.

BEDES and XBRL mapping to each other is likewise not a technological issue.

Further, these are freely available open market information standards that are used by a broad range of independent commercial software application vendors. As a result, the technology approaches used can be as wide and varied as the commercial vendors and as noted above, supply chain standardization has historically resulted in an expansion in the number of vendors and in features or capabilities.

- Applicants should describe the “next logical step” for their project after 2 years of DOE BUILD support

The XBRL/BEDES standard will be continuously updated and improved as more legislation mandates compliance and stakeholders utilize it.

The project has already made inroads for interoperability and the grant will further its mission, but it will go forward with or without the grant, and will continue long after the two year contribution made its impact.

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 10 of 22

**Concept Papers: Technical Review Criteria**

**Criterion 1: Impact of the Proposed Technology Relative to State of the Art (50%)**

This criterion involves consideration of the following factors:

- Method used to identify current state of the art technology  
*07-31 LBNL White paper - Enabling Interoperability through a Common Language proves a clear picture of the current state of the Art.*
  
- If technical success is achieved, the proposed idea would significantly improve technical and economic performance relative to the state of the art.  
*The XBRL –CET expansion will significantly increase potential innovation enabled by interoperability sustained by the XBRL taxonomy. These are freely available open market information standards that are used by a broad range of independent commercial software application vendors. As a result, the technology approaches used can be as wide and varied as the commercial vendors and as noted above, supply chain standardization has historically resulted in an expansion in the number of vendors and in features or capabilities.*

**Criterion 2: Overall Scientific and Technical Merit (50%)**

This criterion involves consideration of the following factors:

- The proposed technology is unique and innovative; and  
*Supply chain standardization (e.g. UPC/bar code, shipping containers, etc.) has demonstrated repeatable economic outcomes including: high volumes; enhanced quality; accelerated frequencies; greater throughputs; lower costs; and others. Applying the same idea via freely available open market information standards is the unique and innovative proposal with the potential to enhance efficiency and improved access to capital as demonstrated in other market applications.*  
  
*As to innovation, the potential is unlimited and not constrained to the grant recipient, but to all stakeholders in many different industries. As outlined in Appendix B there are a range of innovative examples and incremental capabilities realized.*
  
- The proposed approach is without major technical flaws.  
*As evidenced in a broad range of market implementations around the world<sup>5</sup>, any technical issues are nominal. The project is likely to highlight critical implementation considerations related to the process and cultural changes associated with enhancing existing legacy investments. The market implementations outlined in Appendix B provide useful examples as to the diversity of the applications and related process enhancements.*

---

<sup>5</sup> <https://www.xbrl.org/the-standard/why/who-else-uses-xbrl/>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 11 of 22

**Program Policy Factors**

- 1) The degree to which the proposed project, including proposed cost shares, optimizes the use of available EERE funding to achieve programmatic objectives;

The cost benefit, when applied to a national construction in the trillions, and energy related in the hundreds of millions, is as optimal as any can be, without a doubt. A useful example is the MicroFinance Exchange project outlined in Appendix B wherein information standardization enhanced credit processes and thereby lending capabilities and market reach.

- 2) The level of industry involvement and demonstrated ability to commercialize energy or related technologies;

The list of collaborators answers this component. Further, the XBRL US Consortia membership<sup>6</sup> provides a useful example of how market competitors collaborated to create a shared market benefit. The collaboration on standards while competing on implementation may be a useful method of thinking about how freely available open market information standards enable a broad range of economic benefits.

- 3) Technical, market, organizational, and environmental risks associated with the project;

Technical risks are minimal based on the broad range of existing market adoptions.

Market risks associated with the existing highly manual and opaque information exchange and analytical processes constrain market activities and growth. The proposed information supply chain approach provides market risk only to those who choose to delay, minimize or reject implementation.

Organizational risks primarily relate the cultural changes driven by the process changes enabled. The proposed approach provides significant enhancements in data quality by enhancing both validation and analytical processes and more fully described in Appendix C: “Examples of data standards enhancing “validation” processes and thereby data quality”

Making the financial case for environmentally positive construction activity, organized around the current procurement system, will have significant positive environmental impact.

---

<sup>6</sup> <http://xbrl.us/membership/Pages/memberlist.aspx>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 12 of 22

- 4) Whether the proposed project is likely to lead to increased employment and manufacturing in the U.S.;

The improved efficiency in design, procurement, financing, insuring and other related activities will be domestic.

Further, as outlined in the FFIEC Case Study discussed in Appendix C, professionals currently engaged in low value manual data transfers can be migrated into higher value analytical process areas.

- 5) Whether the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;

This is the core premise, without BEDES, SGIP and XBRL providing a data exchange standards that is appealing to all stakeholders, provides compliance and is universally adopted there is no other alternative. Proprietary commercial standards or 'software centric' solutions are simply not widely implementable.

The use of information standards provides a proven approach to transform information exchange and analytical processes thereby enhancing the timeliness, scope and relevance of related business decisions.

- 6) The degree to which the proposed project directly addresses EERE's statutory mission and strategic goals.

We believe there is 100% alignment.

**Cost Share: Minimum 20% of Total Project Costs**

We anticipate raising \$50,000 from collaboration partners to be added to the \$200,000 grant. All funds raised will be given to lead university and detailed in budget submitted with final proposal

- 1) Must be eligible under the award conditions;

We can meet this requirement

- 2) Verifiable from the recipient's records;

We can meet this requirement

- 3) Not included as contributions for any other federally-assisted project or program;

We can meet this requirement

- 4) Necessary and reasonable for proper and efficient accomplishment of project or program objectives; and

We can meet this requirement

- 5) Allowable under the cost principles applicable to the type of entity incurring the cost.

We can meet this requirement

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 13 of 22

*Appendix A. Examples of Semantic Standards Articulated in XBRL*

Following are examples of various semantic standards articulated as XBRL Taxonomies including explicit linkages from individual elements to common definitions, labeling options, contextual attributes (e.g. currency, nature, units, etc.) relationships, and in some cases references to authoritative regulations and laws:

- Financial Semantics:
  - US Financial Accounting Standards Board US GAAP Taxonomy<sup>7</sup>
  - International Accounting Standards Board International Financial Reporting GAAP Taxonomy<sup>8</sup>
  - Indian GAAP Taxonomy<sup>9</sup>
  - American Institute of Certified Public Accountants Audit Data Standards<sup>10</sup>
  - EU Committee of Executive Banking Supervisors Common Reporting Framework (COREP<sup>11</sup> and FINREP<sup>12</sup>)
  - European Insurance and Occupational Pensions Authorities BASEL II Taxonomy<sup>13</sup>
  - Japan Financial Services Agency Next Generation EDINET<sup>14</sup>
  - Microfinance Information Exchange Microfinance Taxonomy<sup>15</sup>
  - Indonesia Stock Exchange (IDX) Taxonomy<sup>16</sup>
  - Canadian Financial Reporting Financial Statements Taxonomy According to Canadian GAAP<sup>17</sup>
  - French Accounting Principles (French GAAP)<sup>18</sup>
  - Brazil GAAP Commercial and Industrial Taxonomy<sup>19</sup>
  - Netherlands Standard Business Reporting Taxonomy<sup>20</sup>

---

<sup>7</sup> <http://www.fasb.org/jsp/FASB/Page/LandingPage?cid=1176164131053>

<sup>8</sup> <http://www.ifrs.org/XBRL/IFRS-Taxonomy/Pages/IFRS-Taxonomy.aspx>

<sup>9</sup> <https://www.xbrl.org/TaxonomyRecognition/India%20Banking%20Taxonomy%202010/Summary%20Document.htm>

<sup>10</sup> <http://www.aicpa.org/InterestAreas/FRC/AssuranceAdvisoryServices/Pages/AuditDataStandardWorkingGroup.aspx>

<sup>11</sup> <http://www.eurofiling.info/corepTaxonomy/taxonomy.shtml>

<sup>12</sup> <http://www.eurofiling.info/finrepTaxonomy/taxonomy.shtml>

<sup>13</sup> <http://www.eurofiling.info/solvencyII/index.shtml>

<sup>14</sup> [http://www.fsa.go.jp/search/20130821/tsummary\\_jp2013New.pdf](http://www.fsa.go.jp/search/20130821/tsummary_jp2013New.pdf)

<sup>15</sup> [https://www.xbrl.org/TaxonomyRecognition/mx\\_2009-06-19\\_summary-page.htm](https://www.xbrl.org/TaxonomyRecognition/mx_2009-06-19_summary-page.htm)

<sup>16</sup> <http://www.idx.co.id/xbrl/taxonomy/IDXSummaryDocument.pdf>

<sup>17</sup> <https://www.xbrl.org/TaxonomyRecognition/Canadian%20GAAP%20Taxonomy%202005-05-10%20Documentation.pdf>

<sup>18</sup> [https://www.xbrl.org/TaxonomyRecognition/Summary\\_TCA-2009-07-07.htm](https://www.xbrl.org/TaxonomyRecognition/Summary_TCA-2009-07-07.htm)

<sup>19</sup> <https://www.xbrl.org/TaxonomyRecognition/Brazil%20FRT%201.0%20Summary.htm>

<sup>20</sup> <http://www.sbr-nl.nl/actueel/nieuwsberichten/item/titel/beta-versie-taxonomie-90-2015-gepubliceerd/>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 14 of 22

- Australian Standard Business Reporting Taxonomy<sup>21</sup>
  - Chinese Accounting Standards Taxonomy (CAS)<sup>22</sup> Chinese CAS Taxonomy Oil and Gas Industry Extension<sup>23</sup>
  - Chinese CAS Taxonomy Banking Industry Extension<sup>24</sup>
  - China Securities Regulatory Commission/Shanghai Exchange Fund Industry Taxonomy<sup>25</sup>
  - Shanghai Exchange China Listed Company Information Disclosure Taxonomy<sup>26</sup>
  - Shenzhen Exchange Listed Company Disclosure Taxonomy<sup>27</sup>
  - And others
- Non-Financial Semantics:
    - US Governance, Risk and Compliance (GRC) Open Compliance and Ethics Group (OCEG) Taxonomy<sup>28</sup>
    - Global Reporting Initiative Taxonomy<sup>29</sup>
    - Carbon Disclosure Project Climate Change Reporting Taxonomy<sup>30</sup>
    - Tata Index for Sustainable Human Development Taxonomy<sup>31</sup>
    - CCI Taxonomy Central Scoreboard for Corporate Social Responsibility<sup>32</sup>
    - Corporate Actions Taxonomy<sup>33</sup>
    - And others
  - Subject Independent Semantics - The XBRL International Global Ledger Framework Taxonomy<sup>34</sup> is the subject-matter independent, holistic, generic and standardized central data hub for representing the files found globally in ERP, operational, business and accounting systems, quantitative and qualitative, enabling the expression of a broad range of financial, non-financial and other data elements in a highly relational context.

---

<sup>21</sup> <http://www.sbr.gov.au/about-sbr/what-is-sbr/sbr-taxonomy>

<sup>22</sup> <http://www.xbrl-cn.org/2010/1019/73285.shtml>

<sup>23</sup> <http://www.xbrl-cn.org/2011/1216/75086.shtml>

<sup>24</sup> <http://www.xbrl-cn.org/2012/1228/84629.shtml>

<sup>25</sup> <http://www.xbrl-cn.org/2010/0901/73511.shtml>

<sup>26</sup> <http://www.xbrl-cn.org/2009/0420/73512.shtml>

<sup>28</sup> <https://www.xbrl.org/TaxonomyRecognition/GRC%20Summary.htm>

<sup>29</sup> <https://www.globalreporting.org/reporting/reporting-support/xbrl/Pages/default.aspx>

<sup>30</sup> <https://www.cdp.net/en-US/News/Pages/in-brief-xbrl.aspx>

<sup>31</sup> [http://tata.com/taxonomy/tata\\_taxonomy\\_documentation.pdf](http://tata.com/taxonomy/tata_taxonomy_documentation.pdf)

<sup>32</sup> <https://www.xbrl.org/TaxonomyRecognition/CCI%20RSC/CCI-XBRL-Summary.htm>

<sup>33</sup> <http://xbrl.us/research/Pages/CorporateActions.aspx>

<sup>34</sup> <https://www.xbrl.org/the-consortium/get-involved/gl/>

## *Appendix B. Examples of Standards Implementations with Scientific and Technical Merit*

Following are examples of various standards implementations that demonstrate scientific and technical merit, particularly in enhancing the seamless exchange and processing of data between constituents using a range of highly diverse commercial software applications:

- Process Convergence (Small and Medium Institutions):
  - MicroFinance Exchange XBRL Case Study<sup>35</sup> - The MicroFinance Exchange (“MIX”) delivers data services, analysis, research and business information on the institutions that provide financial services to the world’s poor. They used XBRL to standardize data and enhance their analytical processes and capabilities lowering the value of lending values thereby reaching a broader market audience. The findings of their implementation included:
    - XBRL can be implemented quickly and easily by non-technical users;
    - XBRL helps to organize these data across countries, legal forms and accounting standards, while still providing sufficient context to maintain key distinctions; and
    - Data-driven approaches and open reporting frameworks present challenges, but deserve consideration. The use of a data-driven model allows us to adapt to changes in the global microfinance sector and captures core benefits of XBRL. Adapting this framework can be complicated, but reveals useful information for comparisons over time and across countries.
  - MACPA Case Study<sup>36</sup> - The Maryland Association of CPAs (“MACPA”) has used XBRL to populate its financial information and key performance indicator reports. Their project provides a blueprint of sorts for how private companies and nonprofit organizations can take advantage of XBRL’s power.
    - “Our ability to take this in-house, implement it, and see benefits fairly quickly at a pretty low cost made us realize that XBRL is real and can really help,” Thomas Hood said, and
    - “The key to our success has been to start our mapping using XBRL’s Global Ledger taxonomy—or XBRL GL, as it is called. This allowed us to easily connect the data from our Association Management System to our General Ledger accounting system.”
- Process Convergence (Large Institutions):
  - FFIEC/FDIC Central Data Repository Program - convergence of Call Report compliance across banking regulators was implemented through outreach to a

---

<sup>35</sup> <http://www.themix.org/sites/default/files/MIX%20XBRL%20Case%20Study%2003.03.10.pdf>

<sup>36</sup> <http://www.journalofaccountancy.com/Issues/2012/Jun/MACPA-XBRL-project.htm>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 16 of 22

broad range of enabling vendors facilitating program adoption within a few months for all federally insured banks in the U.S.

- Dutch Standard Business Reporting (“SBR”) - convergence of legal entity compliance across the broad range of federal, regional and local regulatory agencies in the Netherlands provides a decrease in compliance burden. The Dutch SBR program<sup>37</sup> is considered to be a compliance best practice and is a useful example of the processing standardization and convergence general benefit of supply chain standardization.
- Australian Standard Business Reporting - similar to the Dutch SBR program the Treasurer has implemented an Australian SBR program<sup>38</sup> to reduce compliance burden across all legal entities in the country.
- More Timely Reusable Information:
  - SEC Interactive Data Program - The exposure via RSS feed of structured data company filings enhances the reusability of these disclosures and provides more timely reusable information for stakeholder analysis. Further, the structured data is freely available.
  - FFIEC/FDIC Central Data Repository - The exposure of Call Report data for most U.S. banks is available via Web Service at the FFIEC Central Data Repository's Public Data Distribution web site<sup>39</sup>. Further, the structured data is freely available.
- Enhanced Compliance Processes:
  - International Adoption - Examples of international market adoption of the XBRL standard are included on the consortium web site [here](#)<sup>40</sup>. Adoption methods vary; however, a common implementation theme is the enhancement of compliance processes and the reduction of compliance burden through the migration from unstructured to structured disclosures/data.
- Broad Semantic Standards Support:
  - There are a range of semantic standards expressed in XBRL in markets around the world that are included in Appendix A: “Examples of Semantic Standards Articulated in XBRL” including financial, non-financial and subject independent semantics.
  - The XBRL International Global Ledger Framework Taxonomy<sup>41</sup> is the subject-matter independent, holistic, generic and standardized central data hub for representing the files found globally in ERP, operational, business and accounting

---

<sup>37</sup> <http://www.sbr-nl.nl/english/>

<sup>38</sup> <http://www.sbr.gov.au/>

<sup>39</sup> <https://cdr.ffiec.gov/public/>

<sup>40</sup> <https://www.xbrl.org/the-standard/why/who-else-uses-xbrl/>

<sup>41</sup> <https://www.xbrl.org/the-consortium/get-involved/gl/>

## **Applicability Considerations**

### **XBRL-CET and BEDES**

#### **Buildings University Innovators And Leaders Development (BUILD) - 2015**

**FOA-0001167**

Page 17 of 22

systems, quantitative and qualitative, enabling the expression of a broad range of financial, non-financial and other data elements in a highly relational context. It can be used to articulate a broad range of accounting ledgers, budgetary data and other concepts commonly stored in relational tables.

- XBRL GL can be used to represent information from first transaction or business event through end reporting. Using the standardized semantics/”common data elements” laid out in XBRL GL to represent the content of the US Standardized General Ledger (USSGL) can facilitate communicating the accounts and definitions, account transactions and cross-walks, which will simplify agencies understanding changes expressed in USSGL versions. The same definitions can then be used as agencies report their details, such as procurement, grants, and allotments. As an holistic and generic representation of ERP systems, the same definitions can be used for the more detailed information found in each organization’s sub-systems, facilitating not only the consolidation process, but data integration, data migration and data archival. Leveraging the standard terminology of XBRL GL rather than creating explicit, one-to-one mappings between concepts and data fields promotes reuse of program code and simplifies the process of moving into new areas of standardization.

### *Appendix C. Appendix C: Examples of data standards enhancing “validation” processes and thereby data quality.*

Standardized data enables the use of standardized rules useful in the automation of certain risk assessment, validation, analytical and monitoring processes and procedures across a range of scenarios. In traditional analytical modeling, formulas are typically based upon the physical location of data within a software application’s user interface. For example, a formula that represents a simple concept, such as a ‘current ratio’, would be articulated based upon the physical location of the relevant data (e.g., “B2/F7” in a spreadsheet where B2 is the cell location of “current assets” and F7 is the cell location for “current liabilities”). This physical data orientation hinders the development, sharing, reuse and management of formulas (models) across analytical applications and stakeholder analysts. Machine readable standardized data enables machine readable standardized formulas which can be expressed in a range of machine readable standardized languages including XBRL Formula, RuleML, ISO Schematron, or MathML.

The use of machine readable standardized formulas to test standardized data enables highly reusable and executable analytical formulas or tests of data, based upon the standardized vocabularies. In such a standardized analytical environment, standardized formula or tests are ‘readable’ by both machines as well as business professionals who can share, develop, and collaborate on formulas and tests procedures as they look like a logical sentence (e.g. ‘currentassets/currentliabilities’).

Organizations can use machine readable standardized formulas to express a broad range of validation procedures that test data from reports, ledgers and sub-ledgers. These formulas are very ‘portable’ and sharable, facilitating collaboration and application with appropriate judgment across organizations and disparate ledgers and sub-ledgers within and across organizations. Machine readable standardized formulas or analytical procedures are executable against standardized data from any source systems and thereby enable a more automated and persistent assessment capability. Further, as the machine readable standardized format procedures are reusable across proprietary systems, business professionals can collaborate even more on the governance (e.g. development, maintenance and enhancement) of these standardized format validation and analytical procedures or tests.

Organizations may also use the standardized ledger and related machine readable standardized rules to share and process validation rules by both producing and consuming applications. Organizations use of machine readable standardized validation rules enable execution by both source AND (rather than only) consuming systems; thereby moving validation from consuming to producing systems as a method of enhancing data quality. The FFIEC applied this approach in 2006 and realized a significant enhancement in data quality (e.g. from 66% to 95% compliance)<sup>42</sup>. In the FFIEC case study paper, the collaborative nature of the standardized validation rules enabled application by producing banks as well as the consuming banking regulators. This is clearly visible in **Figure 1**: “FFIEC: Standardized Formula’s Enhances Validation Processes”. The validation rules are presented in both the “Old Process” and “New

---

<sup>42</sup> <http://www.xbrl.org/Business/Regulators/FFIEC-White-Paper-31Jan06.pdf>

**Applicability Considerations  
XBRL-CET and BEDES  
Buildings University Innovators And Leaders Development (BUILD) - 2015  
FOA-0001167  
Page 19 of 22**

Process” and in addition to the data quality improvements noted above, the timeline for validation processing improves from 3 days to 10 hours.

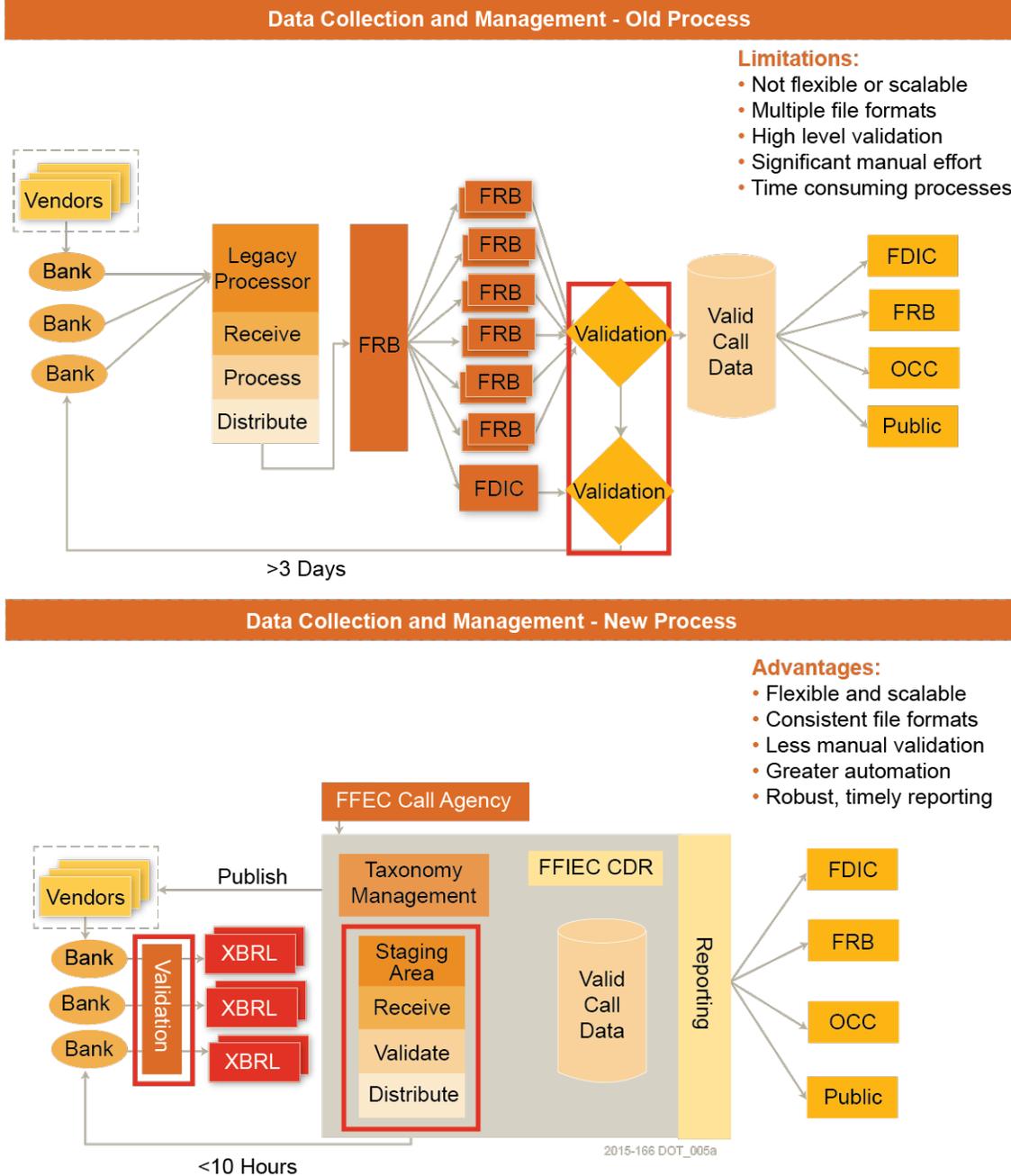


Figure 1. *FFIEC: Standardized Formula’s Enhances Validation Processes*

The Security and Exchange Commission’s (“SEC”) EDGAR Filer Manual<sup>43</sup> provides a range of XML and XBRL related validation rules used by the SEC to validate structured data reports prior

<sup>43</sup> <http://www.sec.gov/info/edgar/edmanuals.htm>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 20 of 22

to acceptance and can also be used by producers prior to submission. The EDGAR Filer Manual separates validation rules between those for syntax and those for semantics. While syntax can be validated at 100%, semantic validation particularly in subjective areas often requires professional insights and judgment to fully assess data quality and compliance.

The United Kingdom's Her Majesty's Revenue & Customs ("HMRC") Corporation Tax Online Service Validation Rules<sup>44</sup> provides another example of XBRL validation rules that can be applied by both the corporations prior to submission of their data as well as subsequently by the HMRC.

Within the Standard Business Reporting program sponsored by the Dutch Ministry of Finance, standardized validation rules are also available for application by entities prior to submission as well as subsequently by the government. The 'Technical Starters Guide XBRL (English)<sup>45</sup> discusses validation options available when standardized rules are used to enable the application by both data producers and consumers.

The Turkish national tax authority provides standardized rules using Schematron in order to encourage higher quality submissions and move more validation "to the front door". The Schematron rules are an integral part of the submission package<sup>46</sup>, which also includes stylesheets for the necessary human review that will supplement virtually all automated testing.

The [AICPA Audit Data Standards<sup>47</sup>](#) ("ADS") are conceptually very similar to the Intelligent Data standards promulgated by the U.S. Treasury as part of the DATA Act implementation. The ADS is one example of a standardized data model useful to address common challenges that agencies and commercial organizations face is obtaining accurate data in a usable format following a repeatable process. The AICPA has developed voluntary, uniform *Audit Data Standards* that identifies the key information needed for audits and provides a common framework covering: (1) data file definitions and technical specifications, (2) data field definitions and technical specifications, and (3) supplemental questions and data validation routines to help auditors better understand the data and assess its completeness and integrity. The ADS is currently available for General Ledgers and Accounts Receivable Ledgers and other ledgers (e.g. Order to Cash, Procure to Pay, Inventory, Payroll, etc.) are under development and will be freely available upon public release.

Another example of a standardized data model useful to professional managers, accountants, risk managers and auditors is the [OCEG GRC-XML specification<sup>48</sup>](#). GRC-XML is a family of languages for Governance, Risk, and Compliance information sharing, integration, and communication. It is based on XBRL and XBRL Global Ledger Framework (XBRL GL). GRC-XML has the potential to provide the:

- Basis for an organization to standardize on a common language of Risk and Control;

---

<sup>44</sup> <http://www.hmrc.gov.uk/softwaredevelopers/ct/ct-onlinevalids.pdf>

<sup>45</sup> [http://www.sbr-nl.nl/fileadmin/SBR/documenten/Technical\\_Starters\\_Guide\\_English\\_march\\_2013.pdf](http://www.sbr-nl.nl/fileadmin/SBR/documenten/Technical_Starters_Guide_English_march_2013.pdf)

<sup>46</sup> <http://www.edeften.gov.tr/dosya/e-DefterPaket.zip>

<sup>47</sup> <http://www.aicpa.org/InterestAreas/FRC/AssuranceAdvisoryServices/Pages/AuditDataStandardWorkingGroup.aspx>

<sup>48</sup> <http://www.oceg.org/resources/grc-xml/#fullcontent>

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 21 of 22

- Ability to compare the results of risk and control initiatives between organizations; and
- Ability for an organization to integrate information between various GRC systems.

In addition to the specific use of standardized rules, business professionals can also leverage machine readable standardized references or relationships as part of their collaborative knowledge base providing explicit and reusable relationships or links to relationships that may currently be largely implicit. Such relationships can be incorporated into validation processes tying specific data patterns to specific analytical rules as well as explicitly linking unique elements to specific definitions. Standardized references are available within the XBRL Specification as ‘Reference Linkbases’ and provide a standardized method of logically connecting concepts including:

- USSGL data elements to definitions and/or audit guidance in FAM, FISCAM, Yellow Book and the Green Book, as well as or other relevant tests/procedures, topical subject matter resources, etc.;
- Report level data elements to definitions and/or audit guidance in FAM, FISCAM, the Yellow Book and the Green Book or other relevant tests/procedures, topical subject matter resources, etc.;
- Data scenarios, patterns or risk profiles to specific audit test procedures and assessments;
- Account balances to processes and controls relevant in reconciliation processes and testing assessments;
- Outcomes of validation and analytical test procedures and assessments to additional test procedures and assessments and/or guidance on how business professionals might proceed based upon specific outcomes; and
- Reported data and disclosures to other relevant resources.

As a result of the machine readable standardized format enabling executable validation procedures or analytical tests, which can be applied to different scenarios with appropriate judgment, business professionals can have an enhanced working environment in which validation and analytical procedures are applied in a more automated, persistent and holistic manner while more quickly revealing, sharing, deploying and executing ‘best practices’ across reports, ledgers and sub-ledgers.

Further, market experience in enabling collaborative processing capabilities indicates that adoption is accelerated among business professionals as they seek to reuse the intellectual property and insights of their peers as a method of improving their specific capabilities and insights. This may be a useful adoption consideration in facilitating viral adoption among supply chain business professionals.

As with other standardized efforts, (e.g. the UPC/barcode), standardized information structures allows for greater levels of automation within business processes thereby further lowering costs, increasing quality and scope of assessments. Some U.S. Federal agencies (e.g. FFIEC, SEC) are already using standardized data and machine readable standardized rules to improve the

**Applicability Considerations**  
**XBRL-CET and BEDES**  
**Buildings University Innovators And Leaders Development (BUILD) - 2015**  
**FOA-0001167**  
Page 22 of 22

effectiveness of their analytical processes through automation while others are applying semantically based agents to make subjective assessments on narrative disclosures within standardized data reports.