NREL - DOE Technology Performance Exchange

2014 Building Technologies Office Peer Review

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Project Summary

Timeline:

Start date: January 27, 2012

Planned end date: September 30, 2014

Key Milestones

1. Launch TPEx with 15 technology product categories; 9/30/2014
2. Recruit three utilities to commit up to $100,000 and use TPEx data; 9/30/2014

Budget:

BTO $ to date: $614,000

FEMP $ to date: $565,000

Other $ to date: $323,759

Total future DOE $: TBD

Target Market/Audience:

Commercial building owners/operators, utilities, technology evaluation staff, manufacturers, energy modelers, researchers

Key Partners:

DOE Federal Energy Management Program
Bonneville Power Administration

Project Goal:

Ensure that necessary energy performance data are easily accessible for a broad array of technologies to reduce investment risk and drive uptake of cost-effective efficiency measures.

Purpose and Objectives

Problem Statement: Perceived fiscal risk associated with the installation of unfamiliar technologies impedes adoption rates for cost-effective, energy-saving products.

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Purpose and Objectives

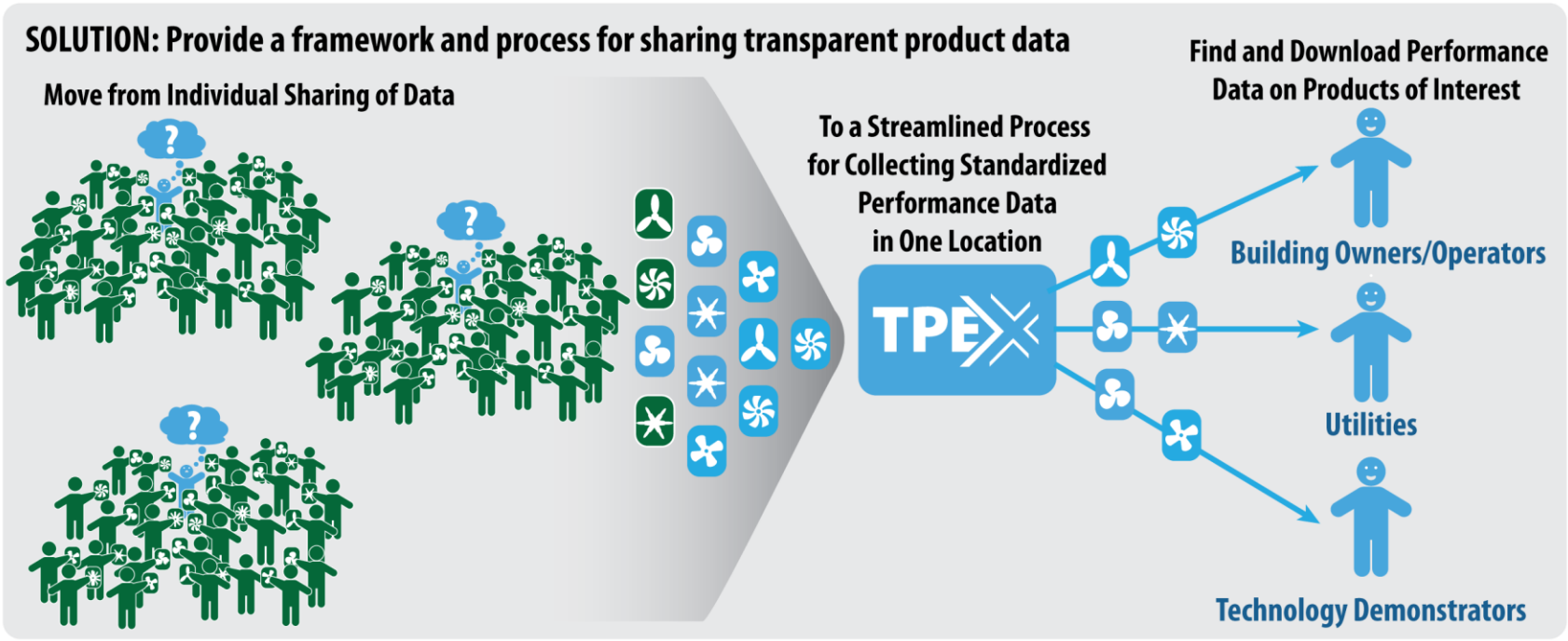
Target Market and Audience: Lower limit – 387 trillion Btu/year[1]

Implementers

- Commercial building owners/operators
- Utilities
- Technology evaluation staff
- Manufacturers

Analysts

- Engineers/energy modelers
- Researchers



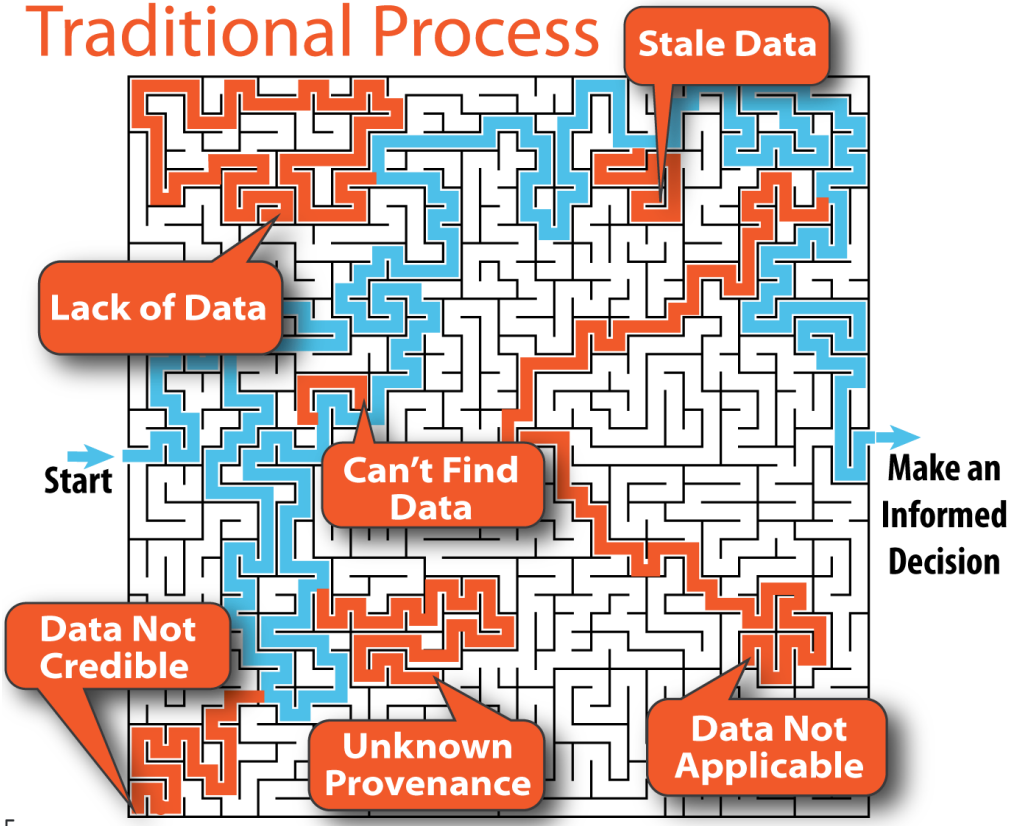
[1] US Energy Information Administration. Electric power sales, revenue, and energy efficiency Form EIA-861 detailed data files. http://www.eia.gov/electricity/data/eia861/ Last accessed April 2, 2014.

Purpose and Objectives

Impact of Project:

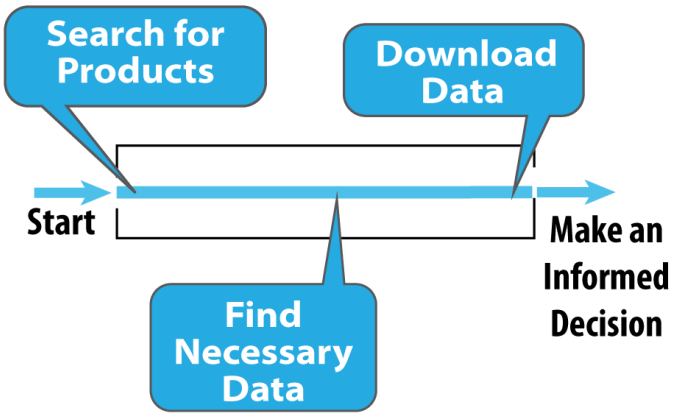
- Ensure that necessary energy performance data are easily accessible for a broad array of technologies to reduce investment risk and drive uptake of cost-effective efficiency measures.
- Success metrics: Number of technology categories, products, and datasets

Traditional Process



credit: http://www.mazegenerator.net/

TPEX Process



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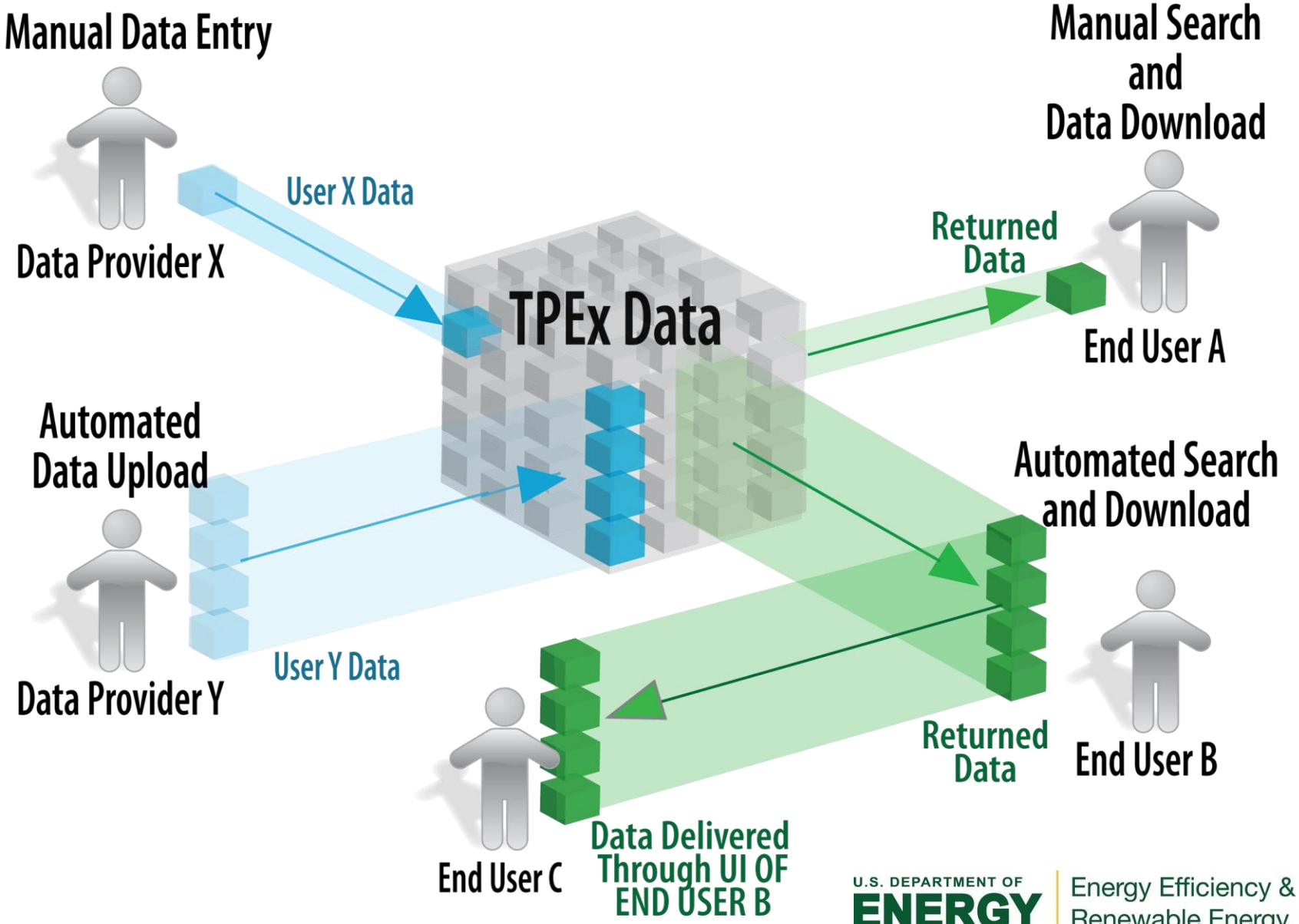
Approach

Approach:

- Define the characteristics necessary to credibly predict performance
  - Bottom-up philosophy
- Create the infrastructure necessary to find, share, and leverage data
  - Restricted workflows
  - Web-based user interface
  - Application programming interface (API)
- Provide data transparency via metadata
  - Organization
  - Derivation method
  - Submission date

Approach



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Approach

Quality Control: Filter performance data by the type of contributor.

Filter by:

- [ ] All
- [x] Contributing Evaluator 46
- [ ] 3rd Party Test Lab 20
- [x] Manufacturer 166

cture		0.895	0.65	420	0.321
		0.895	0.65	420	0.321
		0.895	0.65	420	0.321
cture		0.921	0.70	385	0.456
cturer 3	5819046503	0.921	0.70	321	0.334

Approach

Quality Control:

Provenance

Module Efficiency (average of 5 reports) — **18.40 %**

Source	Posted on	Derivation	Data
Manufacturer of This Product	1/3/2014	Self-Measured, Laboratory	18.43
National Renewable Energy Laboratory	3/6/2014	Calculated Using Others' Measured Laboratory Data	18.37
Federal Energy Management Program	3/12/2014	Calculated Using External Data, Derivation Unknown	18.41
Testing Laboratory Alpha	3/20/2014	Self-Measured, Laboratory	18.39
Utility X	3/21/2014	Self-Measured, Field	18.40

KEY: CONTRIBUTING EVALUATOR | 3RD PARTY TEST LABORATORY | MANUFACTURER/ BRAND OWNER

Approach

Example: Solar PV Module Parameters

- Module Efficiency
- Rated Power
- Cell Material/Type
- Length
- Width
- Total Number of Cells
- Number Of Cells In Series
- Solar Cell Area
- Nominal Operating Cell Temperature
- Short Circuit Current Temperature Coefficient
- Open Circuit Voltage Temperature Coefficient
- Maximum Power Temperature Coefficient
- Maximum Power at LTC
- Maximum System Voltage
- Maximum Stress Limit
- Rated Hail Diameter Impact Resistance
- Rated Hail Speed Impact Resistance
- Manufacturer's Warranty Available
- Warranty Time Length
- Pmp Guaranteed By The Warranty
- Electrical Performance Chart

(Subsection)

Power at Maximum Power Point Values (Watts)					
Light	Irradiance	Module Temperature (˚C)			
Spectrum	(W/m^2)	15	25	50	75
AM 1.5	1,100				
AM 1.5	1,000				
AM 1.5	800				
AM 1.5	600				
AM 1.5	400				
AM 1.5	200				
AM 1.5	100				

Key Issues & Distinctive Characteristics

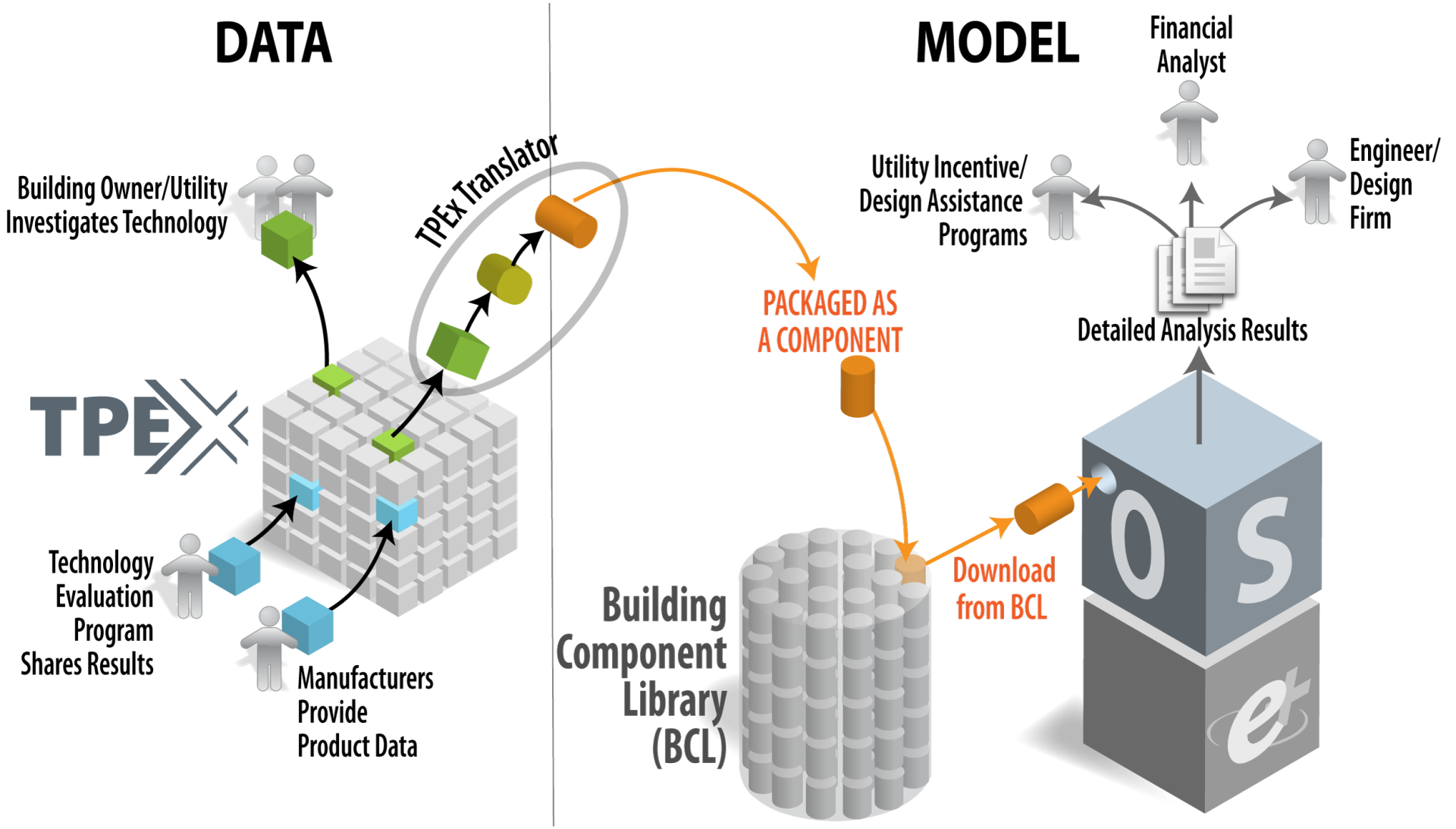
Key Issues:

- Market visibility
  - Communications plan
- Growing the dataset
  - DOE RFI
  - Utility engagement efforts

Distinctive Characteristics:

- Necessary parameters identified up-front to ensure relevance
- Data provenance (provider, derivation, date, etc.) is clearly identified
- Products are NEVER rated or ranked; judgment of “goodness” and “trustworthiness” left to the end user
- API allows automated data uploads/downloads
- Integrated with the Building Component Library/OpenStudio ecosystem

Distinctive Characteristics



Progress and Accomplishments

Lessons Learned:

- Diversity of technology evaluation workflows/processes
- Institutional inertia

Accomplishments:

- Site infrastructure is complete
  - Intuitive Web-based user interface
  - Read/write API
- Six technology categories added in FY14
  - Total now stands at 17
- >20,000 product datasets added
- TPEx integrated with the Building Component Library
- TPEx brand being developed
- Market outreach efforts underway

Progress and Accomplishments

Market Impact:

- Coordinate and leverage utility, state, and federal technology evaluation efforts
  - Working with several utilities to integrate the Technology Performance Exchange into their technology evaluation programs
  - DoD engagement
  - Private sector engagement
- Manufacturer outreach to increase number of datasets
  - RFI, news release, workshops, etc.
- Relationship development at key events
  - Better Buildings Summit
  - ACEEE Summer Study on Energy Efficiency in Buildings
  - ASHRAE Annual and Winter Meetings

Project Integration and Collaboration

Project Integration:

- Better Buildings Alliance specifications
- Utility pilot
- Building Energy Data Exchange Specification (BEDES)

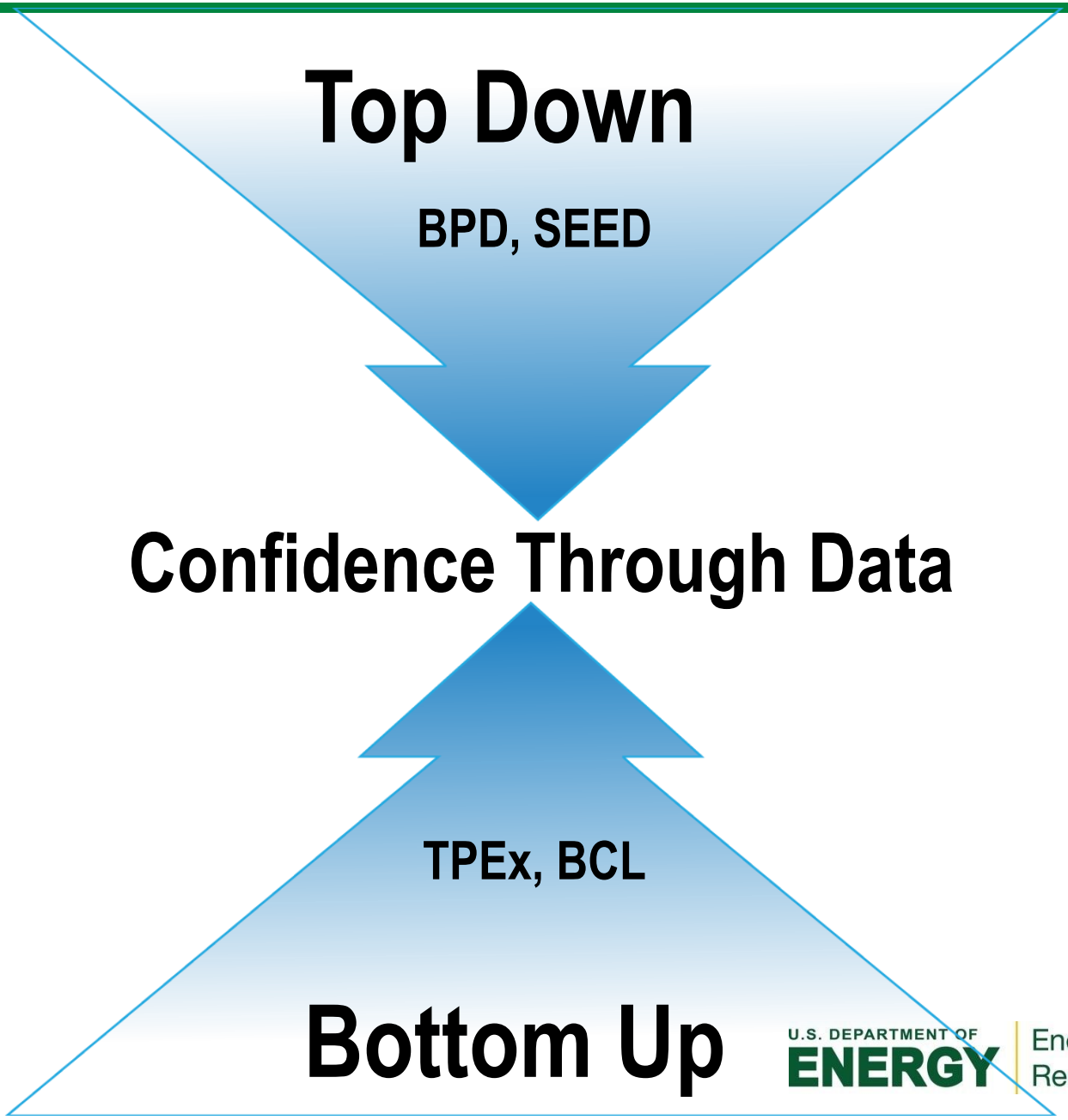
Partners, Subcontractors, and Collaborators:

- Federal Energy Management Program
- Bonneville Power Administration

Communications:

- DOE RFI
- NREL press release
- BTO & FEMP email alerts
- BTO & BBA project webpages
- ACEEE Summer Study on Efficiency in Buildings (future: August 2014)
- News articles (Eco Building Pulse, Energy Manager Today, Green Building Advisor)
- SPC 205 Meeting, 2014 ASHRAE Winter Conference

Integration



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Next Steps and Future Plans

Next Steps and Future Plans:

- Outreach and engagement
  - Gather data on thousands of products
  - Stream millions of performance data points via the API
  - Amplify impact of utility incentive programs
  - Stakeholder addition of new technology categories
- Foster 3rd-party application development
  - Increase use of energy data in procurement decisions
- Residential building technologies
- Transition the site to a relevant non-profit

REFERENCE SLIDES

Project Budget

Project Budget:

- FY2012: $223,000 BTO; $200,000 FEMP
- FY2013: $257,000 BTO; $290,000 FEMP
- FY2014: $134,000 BTO; $75,000 FEMP

Variances: No variance

Cost to Date: 34% of DOE funds spent in FY2014

Additional Funding: Bonneville Power Administration

- FY2013: $222,870
- FY2014: $100,889

Budget History					
FY2012 – FY2013 (past)		FY2014 (current)		FY2015 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
970k	223k	209k	101k	TBD	TBD

Project Plan and Schedule